Management as the sine qua non for M&A success

Manthos D Delis and Maria Iosifidi and Pantelis Kazakis and Steven Ongena

Montpellier Business School, Montpellier Business School, University of Glasgow, University of Zurich

3 August 2018

Management as the *sine qua non* for M&A success

Manthos D. Delis
Montpellier Business School

Maria Iosifidi
Montpellier Business School

Pantelis Kazakis
University of Glasgow, Adam Smith Business School

Steven Ongena
University of Zurich, Swiss Finance Institute, KU Leuven and *CEPR*

Coordinates of the authors: Delis and Iosifidi are with Montpellier Business School, 2300 Avenue des Moulins, 34080 Montpellier, France. E-mail addresses are m.delis@montpellier-bs.com, m.iosifidi@montpellier-bs.com. Kazakis is with University of Glasgow, Adam Smith Business School, Gilbert Scott Building, West Quadrangle, Glasgow G12 8QQ, United Kingdom, pantelis.kazakis@glasgow.ac.uk. Ongena is with the University of Zurich, Plattenstrasse 14, CH-8032 Zurich, Switzerland, phone: + 41 44 634 39 54, e-mail: steven.ongena@bf.uzh.ch.
Acknowledgements: We are grateful to the project partners of the World Management Survey (WMS) for providing the relevant data. The paper was presented at the 2018 Royal Economic Society conference at the University of Sussex, the Conference on Research on Economic Theory and Econometrics (CRETE) 2018 in Tinos, and in seminars at Montpellier Business School, University of Bristol, University of Cagliari, University of Essex, University of Glasgow, and University of Surrey. For comments and suggestions, we are grateful to Renée Adams, Sonny Biswas, Nicholas Bloom, Claudia Custódio, Theodosios Dimopoulos, Alex Edmans, Christos Genakos, Andrey Golubov, Iftekhar Hasan, Constance Helfat, Balint Horvath, George Panos, Dimitrios Petmezas, Rafaella Sadun, Antonios Siganos, Nick Travlos, Mike Tsionas, John Van Reenen, Patrick Verwijmeren, and Betty Wu.

Management as the *sine qua non* for M&A success

Abstract

This paper studies the quality of management of acquiring firms as an important determinant of merger and acquisition (M&A) success. We model management practices as an unobserved (latent) variable in a standard microeconomic model of the firm and derive firm-year management estimates therefrom. We show that our measure is the most important determinant of value creation in M&A deals: a one-standard-deviation increase in the measure almost doubles cumulative abnormal returns. Our results are robust to the inclusion of acquirer fixed effects, to a large set of control variables, and to several other sensitivity tests.

JEL Classification: G14; G34; J24
Keywords: Mergers and acquisitions; Management practices; Acquirer returns

1. Introduction

Despite the voluminous literature on merger and acquisition (M&A) success, the main source of that success remains an issue of debate. Most of the variables that researchers propose as determinants of acquirers' performance add little explanatory power to models of value creation. The main reason is that M&A success relies on variables that, by their own nature, relate to the acquirer's management practices (Golubov et al., 2015), which are either entirely unobserved to researchers or difficult to measure. In this study, we examine the role of management practices in M&A value creation. We show that broadly defined and measured management practices are the most important determinant (*the sine qua non*) of takeover success.

The broad definition of "management practices" includes all business decisions and leadership elements. According to mainstream management theory (Katz, 1974), there are three components of management: human resource management (the ability to interact, communicate, motivate, and negotiate), technical abilities (human capital, knowledge, and proficiency), and conceptual skills (understanding concepts, develop ideas, and implement strategies). We use the term "management practices," as this is the most general term encompassing human resource management, technical abilities, and conceptual skills. Economics textbooks often call the concept entrepreneurship, and some management and accounting textbooks describe it as average skill or ability of executives and managers. Although the extant literature on M&As has been growing steadily over the years, the study of management practices has remained a niche field—most probably a result of the difficulty to measure managerial skills, —thus constituting an important omitted variable.

To measure management practices as broadly defined, we use the implications of recent literature, which suggests that management practices are indispensable in defining production

relations. Specifically, Bloom et al. (2017) build on early models of management by Lucas (1978) and Melitz (2003) and show that besides capital (defined to include physical capital, financial capital, R&D expenses, and land) and labor, firms choose management practices to achieve their objectives. This assumption is perfectly aligned with the idea that there are three (instead of two) inputs of production and that management (or entrepreneurship) complements capital and labor (e.g., Samuelson and Nordhaus, 2009). Importantly, Bloom et al. (2017) use a state-of-the-art index of management practices, composed using their World Management Survey (WMS), and show that firms optimally choose their executives and managers to utilize their talents, skills, and overall competences to improve productivity and value. Thus, the WMS measure is fully in line with the broad definition of management, including human resources, technical, and conceptual skills. Unfortunately, this measure is available for a relatively small number of firms.

Following this set of theoretical models and empirical work, Delis and Tsionas (2018) estimate management practices using a theoretical model very similar to that of Bloom et al. (2017), in which management is the only unobserved (latent) input of production. Their model is estimated for any firm for which accounting measures of inputs/outputs are observed, whereas latent management can be estimated at the firm-year level by priors in Bayesian techniques. To validate their approach and show that management does not capture any other unobserved input of production, Delis and Tsionas compare their management estimates to the WMS measure and show that the two measures correlate by more than 90%. They also validate their approach out of sample using a Monte Carlo approach.

We also resort to using a latent variable model to measure management, as it is the only one available that has three important features. First, it can be used for all firms (acquirers) to

yield a firm-year index and not just the ones in the WMS. Second, it is consistent with both the theoretical economic models of management and the broad definition in the management literature. Third, it can be validated against the WMS or via econometric methods to avoid attributing the estimates to other unobserved inputs. We indeed validate our approach and show that it is a robust measure of management practices.

Subsequently, our main contribution is to identify the effect of the acquirers' management practices on the cumulative abnormal returns (CARs) in M&A deals. We posit that management must be among the most important CAR determinants, given the unique ability of good management to identify prosperous M&A deals and realize them in the most efficient way possible. Thus, our baseline specification follows from the extant literature on CAR modeling around M&As (e.g., Bao and Edmans, 2011; Golubov et al., 2015), with the exception that we add our management index.

The results of our study indicate that *management practices are economically the most significant explanatory variable of CARs*. Specifically, a one-standard-deviation increase in our measure more than doubles the CAR of the average M&A deal. Also, incorporating management practices more than doubles the model's power: the adjusted R-squared increases from 4.3% in the model without management to 9.1% in the model with management.

Importantly, our results are still potent when including acquirer fixed effects in our general sample or in samples of repeated (frequent or occasional) acquirers. Similar to the picture provided by the WMS, our findings suggest that management practices are not merely a firm fixed effect. They are time-variant, implying that the dynamics of employment (entry and exit of employees), the learning process, and depreciation of human capital are important in defining M&A success.

Our baseline results survive across a large battery of sensitivity tests. Specifically, we first use a long list of explanatory variables that the accounting and finance literatures identify as significant determinants of CARs, including corporate governance indicators, characteristics of top executives, and firm performance indicators. Second, we control for industry characteristics (e.g., high-tech firms, R&D expenses, etc.) for the acquirer, the target, or both. Third, we use alternative time windows to construct CARs and remove outliers by winsorizing our data. Fourth, we look at the role of managerial practices in synergistic gains (measured through synergy CARs). In all these specifications, management is the most important determinant of CARs, second only to acquirer's size in the specifications with fixed effects.

There are three interrelated contributions of our paper. First and foremost, we show that management, when broadly measured, is among the most important determinants of M&A success, essentially doubling the power of CAR models. Recent literature, especially Golubov et al. (2015), alludes to the idea, as in standard M&A event studies, the inclusion of acquirer fixed effects markedly increases CAR models' explanatory power. With our management index we explain part of this fixed effect, but also reflect the importance of within-firm variations in management practices, as the effect on M&A success comes over and above acquirer fixed effects.

Second, we introduce to the relevant corporate finance literature (e.g., McDonald et al., 2008; Custódio et al., 2013; Jaffe et al., 2013) a thorough measure of management that originates in standard microeconomic theory. We eclectically view this measure as a complement (not a substitute) to governance characteristics such as executive compensation and CEO experience, which can then be more precise in what they aim to measure.

Third, we bring together four well-established but distinct strands of literature in accounting, corporate finance, management, and production economics. An important accounting literature aims to disentangle the effects of the quality of financial reporting from the efficient management of firms when examining M&A success or other firm outcomes (e.g., Dyer et al., 2016; references therein). The relevant corporate finance literature examines the driving forces behind M&A success and explains a limited part of the variability in abnormal returns (e.g., Moeler et al., 2004; Masulis et al., 2007; Hartford et al., 2012; Golubov et al., 2015). The relevant management literature brings in the theoretical ideas of dynamic manager capabilities (e.g., Kor and Mesko, 2013) and overall effects on performance (e.g., Huselid, 1995). The relevant production economics literature highlights important aspects of empirically estimating production functions (e.g., Greene, 2008; Ackerberg et al., 2006). The merger of these three literatures allows us to explain a significant part of M&A success and opens up new pathways for exploring important aspects of financial management, both within the borders of a country, but also in the international arena.

The rest of the paper proceeds as follows. Section 2 defines management practices, briefly discusses existing measures, and provides the model and estimation for our measure. Section 3 discusses the sample of M&As and estimation of CARs. Section 4 provides the empirical analysis of management practices in the CAR model. Section 5 concludes and provides directions for future research.

2. Management practices: Definition, theory, and measurement

2.1. A broad definition of management practices

Management's role in value creation, governance, board structure, and CEO compensation is a vivid avenue for academic research in accounting, finance, and management sciences (e.g., Harris and Holmstrom, 1982; Hermalin and Weisbach, 1998; Silva, 2010). Here we define management practices in the broadest way possible. Our definition includes three main interrelated dimensions that originate in Katz (1974) and have become benchmarks in management literature.

The first relates to human resource management, which encapsulates the abilities to lead, interact, communicate, motivate, and negotiate. These abilities are fundamental for managing employees of acquirers and targets, motivating them, providing a new vision after an acquisition, and successfully negotiating M&A deals at the highest level of detail. Technical abilities relate to human capital, depth of knowledge, and proficiency among CEOs, top executives, and managers. Technical skill implies, *inter alia*, proficiency in all aspects of firm value creation, including M&A deals or choices regarding those aiding in completing these deals. Third, conceptual skills include understanding concepts, developing new ideas, and implementing strategies. This involves seeing the enterprise as a whole, improving efficiency (the optimal use of inputs), and understanding a firm's relationship with industry, political, social, and economic forces.

Managers, top executives, and CEOs differ markedly in these practices within firms and across time.[1] There are two main reasons for this. First, management is a learning-by-doing process, and good management implies fast learning and adaptation to emerging challenges in quickly changing environments. Second, decision-making teams evolve frequently; new

[1] For international studies of M&As differences would also include cultural components between acquirer and target companies (Morosini et al., 1998; Björkman et al., 2007).

members join the team and others leave. Accordingly, this shapes the skills across the three main dimensions of management.

2.2. Previous measures of management and recent theory

A number of past articles has attempted to capture managerial quality based on a firm's economic outcomes after CEO departure. For example, Hayes and Schaefer (1999) argue that good managers are those individuals whose former firm experienced a negative shock after their leave. Likewise, Bamber et al. (2010) show that managerial skill might affect a firm's accounting and disclosure plans, which can alter earnings and planning with several consequences for the firm's future—the way a CEO manages a company might have long-lasting effects, even after her departure. In addition, managerial skill differentials and styles are also observed to individuals below the CEO level, such as the CFO (Ge et al., 2011). Finally, an important aspect when studying managerial skill is its multidimensional profile. For example, Kaplan et al. (2012) identify two components of managerial practices: general ability and execution skills (e.g., communication and interpersonal skills) and find that CEOs with higher general ability and execution skills are better at increasing firm value.

In M&As, where the allocation of resources is considerable, and the risk of heavy losses is high (Hartford and Li, 2007; Moeller et al., 2005), we expect management practices to play a crucial role in creating value for acquirers. However, the literature considers only how distinct elements of management affect M&A success.

Most closely related to our research objectives, for example, is the work on CEO experience in M&A deals. Jaffe et al. (2013) document that CEOs who were successful in their last deals tend to have higher-performing subsequent acquisitions. Custódio and Metzger (2013)

and McDonald et al. (2008) find that CEOs who have experience in M&As for specific industries are more likely to increase corporate value. This expertise could provide management teams with better information and superior bargaining power, all of which having positive effects for acquiring firms. Hayward (2002) provides similar results from the whole firms' (as opposed to CEO) perspective. However, CEO experience and other corporate governance characteristics do not capture all good management practices.[2]

Several strands of literature attempt to proxy for management practices via firm size, performance indicators, and firm fixed effects. However, performance indicators tend to assume everything is the result of managerial skill; clearly this is not the case, because numerous firm characteristics and operational processes are outside the managers' reach. Similarly, fixed effects tend to assume all time-invariant firm characteristics are management-related, which again is not the case because, *inter alia*, management practices are not stable over time (Bloom et al., 2017).

Recent techniques also include frontier-efficiency methods (e.g., data envelopment analysis, or DEA) and assume that skill is defined as efficiency if one subtracts variables outside the reach of executives and managers, such as firm size and age, market share, ownership status, etc. (e.g., Demerjian et al., 2012). Delis and Tsionas (2018) suggest that there are two problems with this approach. The first is that, especially when using DEA, regressing efficiency scores on covariates results in econometric bias and inconsistency (Simar and Wilson, 2007). The second problem is that the variables used in the second stage never completely capture all firm elements that are beyond managerial control (much like performance indicators). This naturally creates

[2] Advisors could also affect M&A outcomes. For example, Bao and Edmans (2011) find a positive relationship between M&A outcomes and advices received by advisors from U.S. banks. However, this is not the case for cross-border acquisitions, as documented by Rajamani et al. (2016), who find that the employment of internationally diversified advisors decreases M&A returns. A reason for this could be that international advisors have less to lose compared to domestic ones.

omitted-variable bias in the residuals, which then include other elements of efficiency besides those that managers control.

The state-of-the-art way to measure management practices is suggested by Bloom and Van Reenen (2007; 2010) and later studies by the same team. They use survey data (the World Management Survey, or WMS) for a limited number of firms worldwide to quantify best management practices that cover a full spectrum of managerial processes and explain how those processes affect productivity. In doing so, they report data on the usual firm inputs (capital and labor) and output (sales), along with a robust measure of managerial processes (what they call "management practices"). This approach is state-of-the-art because of the survey detail and the thorough illustration of different managerial operations and processes.[3]

Bloom et al. (2017) justify their approach theoretically using a model similar to Lucas (1978). Their model includes management in the firm's production function as an input, which is separate from capital, labor, and a production efficiency component. The distinguishing feature of their model is that management is determined endogenously to its autoregressive component and investment in management. The authors show that this model produces qualitatively similar results and inferences on the role of management in firm performance with those of the WMS-based measure.

Delis and Tsionas (2018) use the theoretical implications of Bloom et al. (2017) to estimate management for all firms for which inputs (capital and number of employees) and output (sales) are available. Their empirical model assumes a cost function of the firm in which

[3] Bloom and Van Reenen (2007), taking all the necessary steps to get accurate (free of measurement error) data, use an evaluation tool designed by a consultancy firm (McKinsey) that is composed of 18 management practices (e.g., performance tracking, or managing human capita, *inter alia*). In addition, using an econometric model of productivity they validate their managerial practices data following a two-step approach, where the production function is estimated in the first stage, and total factor productivity (TFP) is calculated in the second stage. WMS can be retrieved from the following link: http://worldmanagementsurvey.org/survey-data/download-data/

management is an unobserved (latent) input of production. Subsequently, they approximate latent management from its latent dynamics and observed firm characteristics, such as firm size and input prices (as proxies of investment in management). Importantly, Delis and Tsionas validate their model against alternative interpretations of their latent variable by (i) showing that when applied to the WMS data their measure approximates the management practices measure in Bloom and Van Reenen (2007) by more than 90%,[4] and (ii) using restrictive Monte Carlo simulations on a theoretical model similar to that of Bloom et al. (2017).

2.3. Measuring management

Given the above, we measure management by resorting to a version of Delis and Tsionas (2018) because this is the only measure sharing three key features. First, we can estimate management for all firms involved in M&A deals and not just the ones in the WMS. Second, management viewed as an input of the production process is consistent with both the theoretical economic models of management (Lucas, 1978; Bloom et al., 2017) and the broad definition in the management literature (Katz, 1974; many others henceforth). Third, we can validate our approach against the WMS or via Monte Carlo methods to avoid attributing our management estimates to other unobserved inputs.

We assume that management practices constitute an unobserved (latent) input of production, along with labor and capital, the latter being defined to include physical capital, financial capital, R&D expenses, and land. This is a key assumption, implying that the *only*

[4] They use a total of 6,049 observations to estimate managerial practices from the WMS database. For robustness purposes, they also split the sample into four subsamples based in one of the following countries: France, Germany, the United Kingdom, and the United States. Their results are robust in all cases indicating that their measure of management practices highly predicts the values of Bloom and Van Reenen (2007).

unobserved input is management. We back up this "solitude assumption" both theoretically and empirically.

From a theoretical viewpoint, all modern textbooks list human capital, entrepreneurship, or a similar notion as that third factor (e.g., Samuelson and Nordhaus, 2009), and *this completes the list*. Bloom et al. (2017) explicitly model management as that third factor of production (again this completes the list) and show that their model consistently explains productivity and performance differences between firms. The fields of corporate governance and management science largely evolve around the idea that coordinating inputs requires human resource management, technical, and conceptual skills in order to gather, allocate, and distribute economic resources or consumer products to individuals and other businesses. However, and in stark contrast, "best management practices" are then missing from the list of inputs in the estimation of production relations.

From an empirical viewpoint, this assumption is in fact testable as in Delis and Tsionas (2018). We follow this paradigm and validate our management measure in two ways. The first involves estimating our model using data on inputs and outputs from WMS and comparing our management estimates with the WMS management scores. The second is via a Monte Carlo method on a stochastic frontier model. This model creates an environment unfavorable to our approach because it assumes management to be part of the inefficiency component (as e.g. in Demerjian et al., 2012). We conduct this analysis in the Appendix and show that our model produces estimates more than 90% correlated with the WMS measure or the simulated estimates from the Monte Carlo.[5]

[5] The equivalent correlations between management measures derived from frontier efficiency models and the WMS or the simulated scores never exceed 30%.

Instead of using a cost function as in Delis and Tsionas (2018), we prefer to model a production function for two reasons related to simplicity and replicability. First, management directly enters the production function as a latent input. In contrast, cost and profit equations are functions of input prices (and not input quantities), which imply involved transformations including the share equations to estimate management practices. Second, estimation of the production function implies that we do not need data on management compensation (i.e., the price of management quality), which in principle had to be another latent variable in the model. This increases the estimation complexity, potentially introducing further bias in our estimates.

The production function takes the form:

$$q_{it} = f(\beta x_{it}) + u_{it} \quad (1)$$

where q represents the output of firm i in year t and x is the vector of inputs, including management (m). For the estimation, we use a translog specification, which has the appealing properties of flexibility and linearity in the parameters, and is thus the one favored in the literature (e.g., Greene, 2008).

Firm-year data for the estimation of equations (1) and (2) are from Compustat for the period 1980–2016. We proxy firm output using the log of sales, which reflects how well managers maximize revenue. To measure capital, we use the log of the sum of the dollar amount of net property, plant, and equipment; net operating leases; net R&D; purchased goodwill; other intangible assets; and cost of inventory. To measure labor we use the log of the number of employees. The choice of these inputs is justified based on their contributions to the generation of sales revenue and the role of managers in determining their level.

We estimate equation (1) using Bayesian techniques. We prefer Bayesian over simple structural equation modelling for three reasons. First, we have very good priors on explanatory

variables, owing to Bloom and Van Reenen (2007) and their data set. Given that we optimally need one or more variables to approximate management practices, the priors help with better approximation compared to structural equation modelling. Second, structural equation modelling estimated via maximum likelihood usually encounters convergence problems, and our model is no exception. The main reason for this is the presence of latent variables in the model, including dynamic latent variables. Third, and quite important, subject to good priors, specific Bayesian techniques are not overly sensitive when changing the determinants of the latent variable.

For estimation, we assume that the vector of inputs contains unity, so that the first element of β in equation (1) is a random firm-specific intercept. For latent management practices, we assume:

$$m_{it} = z_{it}\delta_i + v_{it} \qquad (2)$$

where the vector *z* includes lagged values of *x*, as well as current and lagged values of the price of labor in logs (the ratio of total personnel expenses to the total number of full-time equivalent employees).

The assumption on the determinants of *m* is also directly guided by economics and management theory. Specifically, we assume that the use of inputs in optimal quantities and their allocation determines the quality of management. We use the previous quarter's input quantities to reduce simultaneity concerns, even though we find no significant differences in the results when using contemporaneous quantities. Also, including the price of labor follows the corporate governance literature identifying compensation as a positive correlate of ability and human capital (e.g., Custódio et al., 2013) and serves as an external instrument. Identification through input prices has a long tradition in the production economics literature (e.g., Nevo, 2001). In our

case, where we assume the labor market is fairly competitive, the price of labor can be a valid instrument (Ackerberg et al., 2006).[6]

Using the WMS data from Bloom and Van Reenen (2007) and a simple OLS regression of inputs on output in that data set, we choose our priors for inputs β across firms i as follows (we drop subscript t for simplicity):[7]

$$\beta_i \equiv [\beta_{i1}, \dots, \beta_{iN}], \qquad i = 1,\dots,N, \tag{3}$$

with:

$$\beta_i \sim N_{k-1}(0.51_{k-1}, \underline{h}_\beta^2 I_{k-1}) \tag{4}$$

so that most of these coefficients are in the (0, 1) interval with 95% prior probability and I_{k-1} is a vector of ones in $\mathbb{R}^{k-1}$. For the management component, we prefer to be *a priori* agnostic and assume an uninformative prior:[8]

$$\beta_{im} \sim N_{k-1}(\bar{\gamma}, \underline{h}_\gamma^2) \tag{5}$$

where $\bar{\gamma} = 0.8$ and $\underline{h}_\gamma = 10^3$. For the estimation of equation (2) we have:

$$\delta_i \sim N_{\dim(\delta)}\left(\bar{\delta} I_{\dim(d)}, \underline{h}_\delta^2 I_{\dim(\delta)}\right) \tag{6}$$

[6] For the price of labor to be a valid instrument in equation (2), the identification condition is that it is uncorrelated with the production function residuals u. For this to hold, we must exclude a number of possibilities. First and foremost, the price of labor needs to strongly affect m. Theoretically, this must hold, as a higher price of labor should reflect better management practices in a competitive labor market. Empirically, we find that this is indeed the case. Second, these prices should not directly affect (enter) the production of firm output. By construction, the production function has this property. Third, and related to the first, the labor market needs to be perfectly competitive so that each firm separately has no effect on market prices. The size and depth of the markets considered should mean that, at least in our data set, this property is satisfied. Fourth, input prices should vary sufficiently to allow for good econometric identification. Our labor prices vary by firm-year so that this condition is also met.

[7] For the estimation of priors, we use log of sales as firm output and the logs of labor and capital as inputs. We choose the same priors for all inputs. This is not a problem, given that we allow variation given the probabilistic framework of the Bayesian method.

[8] This also does not play much role in our end estimates of management practices. Using the distributional information from Bloom and Van Reenen (2007) to construct more informative priors yields very similar results.

where *dim* denotes the dimension of the corresponding vectors, $\bar{\delta} = 0$, and $\underline{h}_{\delta} = 10^3$, so that these priors are relatively uninformative. Also, we allow for different treatment of initial conditions:

$$m_{i0} \sim N(0, 10^4) \tag{7}$$

which is practically also diffuse. Thus, we apply here the principle of indifference, which assigns equal probabilities to all possibilities for management practices. For the intercept, results in the literature are mixed and thus we assume a nearly flat prior:

$$\beta_i \sim N(0, 10^4) \tag{8}$$

As is standard practice in the Bayesian literature, we resort to Markov chain Monte Carlo (MCMC) methods for inference. MCMC can be implemented using a Gibbs sampler where all posterior conditional distributions are in well-known families.[9] We run the Gibbs sampler for 150,000 iterations and burn the first 50,000 to mitigate possible start-up effects. We successfully test convergence using Geweke's (1992) diagnostic; autocorrelation in MCMC never exceeds approximately 0.40 for any parameter.

Using the model described by equations (1) and (2) and the estimation method of equations (3) to (8), we obtain a mean value of management practices equal to 1.51 and standard deviation equal to 0.299. Also, our measure takes values between 0.421 and 3.101. In table A2 of the appendix, we report average estimates of management practices by industry and year. We observe a similar level of skill across industries, which is intuitive as there is *a priori* no reason that more skillful individuals are employed in specific industries. The industries with the highest average management index values are utilities, telephone/TV, and finance. Nonetheless, the

[9] For brevity, these details are available on request.

finance industry has some of the lowest scores in some cases. Other industries that score low in terms of management practices are durables and chemicals.

2.4. Validation of our management index

We note that the numerous assumptions made in estimating the latent-variable model, including assumptions about the data and variables, priors, and functional forms, are decided based on both theory but also on our results' capacity to approximate the state-of-the art measure of the WMS and a Monte Carlo validation method. In the appendix, we report results from these two validation procedures to show that what we measure is indeed management and not some other unobserved input.

First, we show that when we apply our model to the data from the WMS, we achieve an approximately 90% correlation with the index in Bloom and Van Reenen (2007), which is derived from the survey data without any formal estimation of a production relation. In principle, this validation approach is an almost ideal natural experiment in which we compare the state-of-the-art survey-based method to estimate management with our approach and is convincing because such high correlations are not easy to obtain. Without condemning previous methods using frontier techniques to estimate management practices, the recent literature shows that these techniques fail to pass validation using the WMS data (e.g., Delis and Tsionas, 2018).

Second, to avoid criticism that our method works only within the WMS sample, we conduct a Monte Carlo analysis based on 1,000 simulated samples. We generate these samples using a production model as in equation (1) but separate the stochastic term into an inefficiency component and the remainder disturbance. This implies that the Monte Carlo is more favorable to the frontier efficiency models in estimating management compared to our model. We provide

the technical details for the Monte Carlo in the Appendix. Our findings show that for reasonably large samples such as ours, the rank correlations between the simulated management scores and the estimated management scores using our model and the simulated samples are between 85% and 92%, depending on whether input prices in the production relation are observed or missing. These are very high values and equivalent to those observed under the WMS validation procedure. Given the two validation approaches, we can safely assume that our model produces very good management estimates.

3. M&A sample, CAR estimation, and summary statistics

We draw M&A data from the Thomson One Banker database for January 1, 1980, to December 31, 2016. The data-selection process follows the five restrictions imposed by Fuller et al. (2002), Masulis et al. (2007), and Golubov et al. (2015). Specifically, (i) the bidder is a U.S. publicly listed company, and the target is either a public, private, or subsidiary U.S. company; (ii) the acquisition is complete; (iii) the acquirer owns less than 50% of the target prior to the acquisition and 100% after; (iv) the transaction is at least 1% of the bidder's market capitalization 11 days prior to the announcement and it exceeds $1 million in value; and (v) multiple deals within the same day for the same acquirer are excluded.

We end up with 15,261 events. From this sample, we drop observations lacking information on the variables needed to estimate management practices and on some of our important controls used in the baseline specifications. Our final sample has 8,106 events.[10] We provide variable definitions and data sources in table 1 and summary statistics in table 2. Following Fuller et al. (2002) and Golubov et al. (2015), we carry out our analysis using three

[10] When we study synergistic gains the number of observations drops to around 1,050. This is expected because we deal with targets that are not listed and thus do not have information in CRSP.

samples. The first includes all deals (full sample), the second includes acquirers that completed at least five deals within a three-year time window (frequent acquirers), and the third includes acquirers who completed at least two deals within a three-year window (occasional acquirers). This practice allows us to study persistence in acquirers' returns and use acquirer fixed effects. The sample of frequent acquirers includes 1,319 deals, and the sample of occasional acquirers includes 5,487 deals. Nonetheless, as the number of observations drops considerably when we study synergistic gains, we use the whole sample without distinguishing between frequent and occasional acquirers.

As in previous studies, we find anemic gains for acquirers. Based on the summary statistics of table 2, the mean CAR is about 1.3% and the median 0.7%. This is not the case for target firms, where the mean (median) CARs are 26.1% (22.2%), respectively. For synergies, we have a mean of 2.3% and a median of 1.6%.[11]

Using firm fixed effects is very important because it disentangles the time-invariant firm characteristics from our time-variant (firm-year) measure of management practices. In our view, management practices, as defined in our context, are dynamic through a learning-by-doing process and the addition of new managers and executives. In that sense, and unlike previous studies, we examine the role of time-varying, firm-specific management practices in M&A success.[12] Although our focus is on acquirers, we study the role of acquirer management practices on the combined firm CARs in a subsequent section.

[Please insert tables 1&2 about here]

[11] Past studies have also found positive combined returns (e.g., Andrade et al., 2001; Moeller et al., 2004; Bhagat et al., 2005; Wang and Xie, 2008).

[12] This comes at the cost of being unable to conduct any meaningful analysis on target firms and their management practices. The reason is that, while studying frequent and occasional acquirers, we limit our sample to firms with repeated acquisitions and, thus, a reduced sample of M&As. The sample of targets then becomes quite small because target firm information in Compustat and CRSP is quite limited (e.g., if the firm is not public there is no information in CRSP). Subsequently, when the number of targets decreases, the same happens for synergy calculations, as target information from CRSP is needed to measure synergy CARs.

Table A3 in the appendix reports average acquirer CAR (-2, +2) values for the period 1980–2016 for 12 different industries. The highest values are in the telephone/TV and consumer (durables and nondurables) industries. However, some of these industries perform either superbly or very poorly around the events, indicating high volatility.

Table 3 reports distributional information on the management practices index and three different acquirer CARs (three-, five-, and 11-day windows around an M&A). The statistics show that the management quality of the lowest 1% is slightly less than 1, but for the top 1% this value surpasses 2. This indicates that management practices among top performers are about 2.14 (2.076/0.970) times better than those among low performers. The range between the 75th and 25th quartile is about 0.50 points, which accounts for about one-third of the mean value of the management practices index.

As expected, there are considerable differences in abnormal returns. For the bottom 1% of performers, the returns are negative and span from -28.2% for CAR (-5, +5) to -18.4% for CAR (-1, +1). In contrast, the top 1% performers have returns spanning from 25.1% to 35.3%. Hence, the average difference in cumulative returns between top and bottom performers is about 50%. With an average of 8.2%, the interquartile difference ranges from 6.3% (for the three-day window) to 10.5% (for the 11-day window). This indicates that for a market capitalization of $3,588 million (the mean in our sample), moving from an acquirer in the first quartile to an acquirer in the third quartile will result in gains of about $294.2 million. This outcome is in line with the findings of Golubov et al. (2015), who argue that acquirers tend to either be very good or very bad in mergers and because of this, there is a considerable gap between the top and bottom bidders.

Solitary events of firms that appear once in our sample can drive this number—and thus drive our results in a specific direction. We therefore show statistics for frequent and occasional acquirers. Occasional acquirers tend to have, on average, slightly lower CAR interquartile ranges compared to frequent acquirers (8% versus 8.4%). Hence, the mean interquartile value for frequent acquirers translates into almost $301.4 million. It is worth noticing that the median value of CARs is very low (1.4%). That is, the average acquirer has an anemic positive outcome from M&A activities, revealing that acquirers are either extremely good or bad performers (similar findings occur in Golubov et al., 2015, and Gompers et al., 2010).

[Please insert table 3 about here]

4. Empirical results

4.1. Empirical model and results without management

We now turn to explaining the observed valuation effects with our management practices index. The regression for the benchmark model is:

$$CAR_{it} = \beta_0 + \beta_1 \Psi_{it} + \beta_2 \Omega_{it} + \mu_i + \nu_t + \epsilon_{it} \quad (9)$$

where Ψ and Ω are vectors of firm and deal characteristics, respectively, and μ and ν are firm and year fixed effects. Definitions for all variables in this model are in table 1, and summary statistics are in table 2.

For comparative purposes with benchmark empirical studies, we first estimate a CAR (-2, +2) model without our management index (e.g., Masulis et al., 2007; Bao and Edmans, 2011; Golubov et al., 2012; Harford et al., 2012). In table 4 we report our findings for the full sample, as well as for frequent and occasional acquirers. These findings are very similar to those in the benchmark studies. Specifically, acquirer size, buying public targets using stock, and Tobin's q

enter with a negative and highly significant coefficient.[13] In contrast, relative size, buying private targets using stock, and buying subsidiary targets with cash have a positive and significant effect on CARs.[14] Variables such as *relatedness* and *free cash flow* have marginally significant effects in the full sample.[15]

What is crucial to notice here is the very low explanatory power of the models, with the R-squared and adjusted R-squared being 4.5% and 4.3%, respectively, in the full sample. This level of explanatory power is highlighted in Moeller et al. (2004), Masulis et al. (2007), Harford et al. (2012), and Golubov et al. (2015), among others.

[Please insert table 4 about here]

4.2. Baseline results with management

We report our baseline results of the effect of management practices on CAR (-2, +2) in table 5. In the first three columns we report results without acquirer and year fixed effects, which are added in the last three columns. *Management practices* enters with the expected positive sign and it is statistically significant at the 1% level in all specifications. The coefficient estimate for the full sample and without (with) fixed effects equals 6.6% (5.1%). The finding in column (1) indicates that a one-standard-deviation increase in *Management practices* (equal to 0.299), increases CAR by 0.020 (obtained from 0.299*0.066). Given that the mean CAR in our sample

[13] The latter result highlights that Tobin's *q*, previously a measure of management quality (e.g., Lang et al. 1989), does not properly reflect this quality.

[14] Previous research documents that the payment method for M&As matters. Specifically, Travlos (1987) and Franks et al. (1988) find that cumulative abnormal returns are higher when acquirers pay with cash instead of equity. Using stock to pay for acquisitions may signal firm internal problems that may lead to a decrease in the acquirer's value. That is, firms could be overvalued and thus sell their stock (see also Myers and Majluf, 1984; Baker and Wurgler, 2002; Jensen, 2005; Golubov et al., 2016). As far as private/subsidiary targets are concerned, Fuller et al. (2002) find higher CARs for firms that acquire targets with stock.

[15] In the main specifications, *Relatedness* is based on the two-digit SIC codes. As two-digit codes could be quite crude in determining whether two firms are related, we replicate this exercise using four digit SIC codes to construct an alternative *Relatedness* indicator. We find no significant change in our main results (see table A5 in the Appendix).

is 0.014, this increase is more than 100%. Similarly, the coefficient on *Management practices* in column (4) shows that a one-standard-deviation increase in management practices increases CAR by 0.015 points. We document equivalently large increases for frequent and occasional acquirers. We find that the coefficient is larger for frequent acquirers compared to occasional acquirers, indicating that frequent acquirers possess management practices that are crucial for the success of M&As.

[Please insert table 5 about here]

To make the importance of our findings more explicit, in table A4 in the appendix, we report the standardized (beta) coefficients of table 5. These statistics allow for a direct comparison of the relative effects of the explanatory variables of CARs, showing that *Management practices* is the most important variable in explaining a firm's CAR following M&A in the models without fixed effects. In the models with fixed effects, the potency of the effect of *Management practices* on CARs is second only to acquirer size. Thus, it comes as no surprise that the adjusted R-squared of the models in table 5 (0.091) substantially increases (more than doubles) compared to the one in table 4 (0.043). These results highlight the importance of including our management practices index in the CAR model.

The role of fixed effects also deserves special mention. The use of fixed effects increases the adjusted R-squared by about 3.4 points when using the full sample. Comparing the same specifications, the coefficient on *Management practices* decreases from 0.066 in models without fixed effects to 0.0513 in models with fixed effects. This decrease implies a decline from a 0.020 point increase in CAR to a 0.015 point increase in CAR when increasing *Management practices* by one standard deviation.[16] The 0.005 difference is statistically significant at the 1% level

[16] Naturally, the models with fixed effects have fewer observations. If we reestimate the models without fixed effects for the sample of the models with fixed effects, there is no change in our inference. Notably, the year fixed

(obtained from a Hausman test) and indicates that part of *Management practices* is indeed a firm fixed effect. However, three-quarters of the effect of management practices remains, even in models with fixed effects. This suggests that the role of management practices differs substantially from one acquisition to another. Thus, management practices are dynamic in the sense that good management implies adaptation to the unique environment surrounding each acquisition.

4.3. Sensitivity to additional control variables

In this section, we explore the robustness of the effect of management practices once we control for a series of variables shown to affect CARs in the literature. Essentially our tests show that our management index does not capture the effect of these variables.

First, we look into the role of authority within companies, as corporate governance could affect shareholder behavior. Gompers et al. (2003) argue for the importance of balance of power and use a governance index *(G-index)* based on anti-takeover provisions to test their hypothesis. Lower G-index values indicate relatively democratic firms, while higher values characterize a more despotic corporate environment. They find that firms with higher G-index values have lower corporate values. Similarly, Bebchuk et al. (2009) construct an entrenchment index (*E-index*), which *inter alia* accounts for mergers and charter amendments; they find that increases in this index are associated with decreases in corporate value and abnormal returns.[17]

In table 6 we report results from specifications including the G-index and the E-index. We find that both indices enter with insignificant coefficients. In contrast, *Management practices*

effects do not play any role in the results (they are jointly insignificant) and any change in the results between the first three and the latter three columns of table 5 come from the firm fixed effects.

[17] An issue further complicating firm's governance is directors' incentives. For example, Bushman et al. (2004), document that directors' incentives increase with firm complexity and differ with earnings timeliness.

enters with a positive and highly significant coefficient at the 1% level. The value of the coefficient is lower compared to the benchmark model, but this is probably due to the large decrease in sample size due to the unavailability of information for newly added indices for a number of firms and years. Indeed, using the same observations as in table 6 and our baseline specification (column 4 of table 5), the results are equivalent to those reported in table 6.

[Please insert table 6 about here]

Second, management practices might erroneously capture the effect of time-varying corporate governance characteristics, such as compensation and experience of the top-management team.[18] We include the relevant variables and report the results in table 7. Again, our management index enters with a positive and significant coefficient at the 1% level. *Ergo*, in the sample where all controls are used (column 6) a one-standard-deviation increase in *Management practices* is associated with a 0.011 unit increase in CAR. This effect is economically still very large but somewhat smaller than the equivalent in our baseline results. However, as in table 6, this is due to the loss in observations and not the inclusion of the additional controls.

Regarding the governance characteristics, we find that none of these variables consistently has a significant effect on CARs across the six specifications. Thus, management practices are by far the most significant governance-related factor in the CAR model.

[Please insert table 7 about here]

In the regressions in table 8, we control for several firm-performance variables, such as return on assets (*ROA*), return on equity (*ROE*), *annual stock return*, *net profit margin*, capital expenditures as a proportion of assets (*CAPX*), and *industry sales Herfindahl*. This could be an

[18] The top-management team includes individuals above the vice president level and thus can be considered senior executives (Chemmanur and Paeglis, 2005). For relevant empirical studies, see Gabaix and Landier (2008), Tervio (2008), Edmans et al. (2009), Custódio et al. (2013).

important addition to our baseline specification because our index should strictly capture management practices and not the overall performance of firms.

We find that the effect of *Management practices* changes only slightly from the baseline specifications of table 5, indicating that our main finding is robust to the inclusion of firm-performance indicators. In the specification where most controls are included (column 8), a one-standard-deviation increase in *Management practices* leads to a 0.015 point increase in CAR (exactly the same as our baseline specification). As for the performance-related variables, we find that *net profit margin* is the most important (negative) determinant of M&A success, while *ROE*, *annual stock return*, and *industry sales Herfindahl* are marginally statistically significant variables.

The results regarding *net profit margin* are somewhat puzzling, however. We expect that firms with more cash flow are more capable of creating firm value through M&As. A potential answer to this puzzle could be that profitability indices do not necessarily capture firm characteristics—including management practices—that are of high importance in value creation through M&As. The negative coefficient on *industry sales Herfindahl* could signal inefficiencies that are more pronounced in more concentrated sectors, where firms live the quiet life (Hicks, 1935).

[Please insert able 8 about here]

A last set of additional control variables that could affect the relation between effective management and CARs concerns industry characteristics. Several papers allude to the role of industry characteristics in M&A value creation. For example, one strand of literature argues that efficiency problems occur more in conglomerates (e.g., Rajan et al., 2000; Scharfstein and Stein, 2000). Lang and Stulz (1994) show that multisegment firms have lower Tobin's *q* values. In the

same spirit, Berger and Ofek (1995) argue that conglomerates are worth about 15% less than stand-alone firms. On the other hand, conglomerates allocate capital better due to their centralized control (e.g., Stein, 1997). Similar arguments are in the literature on the role of technology and innovation.

We add three controls to examine whether the acquirer and the target (i) belong to the same Fama-French industry (*Conglomerate*), (ii) belong to high-tech industries (*TECH),* and (iii) have high R&D intensity (*RD intensity*). Given that our aim is to identify industry characteristics as variables potentially biasing our estimates on *Management practices* and not to identify the mere effect of industry characteristics, we also saturate the model using Fama-French industry fixed effects.

We report the results in table 9. If anything, in the last specification (column 7), our management practices index enters with a slightly larger coefficient compared to the baseline specification. A one-standard-deviation increase in *Management practices* implies a higher CAR (-2, +2) by approximately 0.018 points. As far as the other controls are concerned, the model in column (7) indicates that firms with higher R&D intensity tend to have lower CAR values, while *Conglomerate* enters with a negative yet insignificant coefficient. Further, *TECH* does not seem to affect CARs, as the coefficients we obtain are negative yet insignificant. We should note here, however, that the large set of fixed effects might oversaturate the model and prevent proper identification of the effect of industry characteristics.

[Please insert table 9 about here]

4.4. Sensitivity to the definition of CARs and outliers

To ensure that our results are not driven by the time around the events, we repeat the previous models with CARs calculated over three- and 11-day windows. The results are in table 10 and are almost identical to those obtained in the baseline models. For example, for frequent acquirers and using fixed effects, the coefficient is positive and statistically significant with a value of 0.0587 for CAR (-1, +1) and 0.0558 for CAR (-5, +5). These values are almost identical to the value of 0.0564 reported in table 5.

[Please insert table 10 about here]

Finally, we look into the possibility that outliers drive our results. For this reason, we winsorize our variables at the 1% and 99% levels and repeat our analysis. The results in table 11 remain highly significant, although now the coefficient on *Management practices* is somewhat smaller. For example, for the benchmark model for the frequent acquirers, the coefficient is 0.0368 (as opposed to 0.0564). We should note, however, that dropping outliers might create downward bias on the effect of management practices because we exclude the extraordinary performers in terms of management quality.[19]

[Please insert table 11 about here]

4.5. Synergies

Having studied the impact of management practices on acquirers' CARs, we next look at firm synergies. This is important, as previous research found M&As to positively affect the cumulative abnormal returns of the combined firm (e.g., Andrade et al., 2001) and firm productivity (Maksimovic and Phillips, 2001). More recently, Li (2013) suggests that the

[19] The respective exclusion of the observations with low *Management practices* does not seem to play a major role. This is because the distribution of *Management practices* is leptokurtic, implying relatively concentrated scores across firms, and negatively skewed (skewed to the right), implying that relatively few firms have very low *Management practices* scores and the mean scores are closer to the maximum value.

increase in target's productivity comes from decreases in capital expenditures and labor expenditures, and associated efficiency gains, all of which are incorporated into market expectations. These arguments strengthen our insight, whereby the market expects the quality of acquirers' managers to be positively related to the post-M&A productivity and efficiency of the new firm and eventually its value.

We calculate synergies following Bradley et al. (1988). We construct a value-weighted portfolio for the acquirer and the target, with weights based on market capitalizations of the acquirer and the target at the sixth trading day before the announcement (also see Wang and Xie, 2008). As shown in table A6 of the appendix, there is a positive correlation among all cumulative abnormal return measures.

To quantify the effect of management practices on synergistic gains, we re-run our main specifications having as dependent variable the synergistic gains for different time windows.[20] Comparing tables 5 and 12, the results look similar: in table 5 the coefficient on management practices is 0.0513 for the whole sample and in table 12 it is 0.0518. The estimates on the controls are also very similar.

[Please insert table 12 about here]

We next include governance controls. The coefficients are still positive and relatively close to the values of table 6. Nonetheless, we have statistical significance only when the dependent variable is synergy CAR (-1, +1). We should stress though, that compared to the initial (small) sample, this one has at least three times fewer observations. Thus, the absence of statistical significance here is due to lack of statistical power.

[Please insert table 13 about here]

[20] Because our sample is much smaller now, we do not include firm fixed effects.

We also obtain similar findings when we look at the effect of management practices in synergistic gains while accounting for industry-specific characteristics (see table A7). The coefficient is positive and statistically significant at the 1% level, further adding to our main insights that management is indeed one of the most important shaping forces of M&A success.

5. Conclusions

This paper contributes to the M&A literature in three interrelated ways. First and most important, we measure management practices using standard microeconomic and management theory and show that our measure is the most significant explanatory variable in empirical models of M&A success. Essentially, including management practices doubles the explanatory power of these models, with a one-standard-deviation increase in our index doubling CARs around M&A deals.

Second, we provide a new time- and firm-variant measure of management practices that corroborates the broad definition of management theory and aligns with the production economics literature. Our analysis shows that the effect of management practices on M&A success comes over and above previously used characteristics of the firm and its governance, as well as time-invariant acquirer characteristics. Thus, we contend that the effect of management practices is indeed time-variant and cannot be solely attributed to experience, previous success, or other unobserved time-invariant firm characteristics.

Third, our analysis brings together three rather distinct literatures in corporate finance, management, and production economics. This synthesis, allows the measurement of management practices in a way that significantly predicts M&A success. In turn, the synthesis of the literatures is a first step toward examining other more specific theories. One such extension resides in reexamining the relation between management practices and corporate characteristics

such as CEO turnover, board independence, and female participation on the board. Further, our analysis provides incentives to reexamine the relation between the quality of managerial practices and executive or employee compensation. Finally, our approach to estimating management practices via a latent variable model might provide new ideas for modelling notions that, by their own nature, are unobserved. These include but are not limited to social corporate responsibility, corporate culture, and accounting practices such as earnings management and profit-shifting. We leave these ideas as a desideratum for future research.

References

Ackerberg, D. A., Caves, K., & Frazer, G. (2006). Structural Identification of Production Functions. *mimeo*, UCLA Department of Economics.

Andrade, G., Mitchell, M., & Stafford, E. (2001). New Evidence and Perspectives on Mergers. *Journal of Economic Perspectives*, *15*(2), 103-120.

Andreou, P.C., Philip, D., Robejsek, P. (2016). Bank liquidity creation and risk-taking: Does managerial ability matter? *Journal of Business Finance and Accounting, 43*, 226-259.

Baker, M., & Wurgler, J. (2002). Market Timing and Capital Structure. *Journal of Finance*, *57*(1), 1-32.

Bamber, L. S., Jiang, J., & Wang, I. Y. (2010). What's my style? The influence of top managers on voluntary corporate financial disclosure. *Accounting Review*, 85(4), 1131-1162.

Bao, J., & Edmans, A. (2011). Do Investment Banks Matter for M&A Returns? *Review of Financial Studies*, 24, 2286-2315.

Bebchuk, L., Cohen, A., & Ferrell, A. (2009). What Matters in Corporate Governance? *Review of Financial Studies*, *22*(2), 783-827.

Berger, P. G., & Ofek, E. (1995). Diversification's Effect on Firm Value. *Journal of Financial Economics*, *37*(1), 39-65.

Bhagat, S., Dong, M., Hirshleifer, D., & Noah, R. (2005). Do Tender Offers Create Value? New Methods and Evidence. *Journal of Financial Economics*, *76*(1), 3-60.

Björkman, I., Stahl, G. K., & Vaara, E. (2007). Cultural differences and capability transfer in cross-border acquisitions: The mediating roles of capability complementarity, absorptive capacity, and social integration. *Journal of International Business Studies*, 38(4), 658-672.

Bloom, N., Sadun, R., & Van Reenen, J. (2017). Management as a technology? National Bureau of Economic Research Working Paper No. 22327.

Bloom, N., & Van Reenen, J. (2007). Measuring and Explaining Management Practices Across Firms and Countries. *Quarterly Journal of Economics*, *122*(4), 1351-1408.

Bloom, N., & Van Reenen, J. (2010). Why do Management Practices Differ across Firms and Countries? *Journal of Economic Perspectives* 24, 203-224.

Bonsall IV, S.B., Holzman, E.R., Miller, B.P. (2016). Managerial ability and credit risk assessment. *Management Science, 63*, 1425-1449.

Bradley, M., Desai, A., & Kim, E. H. (1988). Synergistic Gains from Corporate Acquisitions and Their Division Between the Stockholders of Target and Acquiring Firms. *Journal of Financial Economics*, 21(1), 3-40.

Bushman, R., Chen, Q., Engel, E., & Smith, A. (2004). Financial accounting information, organizational complexity and corporate governance systems. *Journal of Accounting and Economics*, 37(2), 167-201.

Chemmanur, T. J., & Paeglis, I. (2005). Management Quality, Certification, and Initial Public Offerings. *Journal of Financial Economics*, *76*(2), 331-368.

Custódio, C., Ferreira, M. A., & Matos, P. (2013). Generalists versus Specialists: Lifetime Work Experience and Chief Executive Officer Pay. *Journal of Financial Economics*, *108*(2), 471-492.

Custódio, C., & Metzger, D. (2013). How do CEOs Matter? The Effect of Industry Expertise on Acquisition Returns. *Review of Financial Studies*, 26(8), 2008-2047.

Delis, M. D., Tsionas, E. G. (2018). Measuring Management Practices, *International Journal of Production Economics*, forthcoming, doi: 10.1016/j.ijpe.2018.02.006.

Demerjian, P., Lev, B., & McVay, S. (2012). Quantifying Managerial Ability: A New Measure and Validity Tests. *Management Science*, *58*(7), 1229-1248.

Dyer, T., Lang, M., Stice-Lawrence, L. (2016). Do managers really guide through the fog? On the challenges in assessing the causes of voluntary disclosure. *Journal of Accounting and Economics*, *62*(2-3), 270-276.

Edmans, A., Gabaix, X., & Landier, A. (2009). A Multiplicative Model of Optimal CEO Incentives in Market Equilibrium. *Review of Financial Studies*, *22*(12), 4881-4917.

Faccio, M., & Masulis, R. W. (2005). The Choice of Payment Method in European Mergers and Acquisitions. *Journal of Finance*, *60*(3), 1345-1388.

Franks, J. R., Harris, R. S., & Mayer, C. (1988). Means of Payment in Takeovers: Results for the United Kingdom and the United States. In *Corporate Takeovers: Causes and Consequences* (pp. 221-264). University of Chicago Press.

Fuller, K., Netter, J., & Stegemoller, M. (2002). What Do Returns to Acquiring Firms Tell Us? Evidence from Firms that Make Many Acquisitions. *Journal of Finance*, *57*(4), 1763-1793.

Gabaix, X., & Landier, A. (2008). Why has CEO Pay Increased So Much? *Quarterly Journal of Economics*, *123*(1), 49-100.

Ge, W., Matsumoto, D., & Zhang, J. L. (2011). Do CFOs have style? An empirical investigation of the effect of individual CFOs on accounting practices. *Contemporary Accounting Research*, 28(4), 1141-1179.

Geweke, J. (1992). Evaluating the Accuracy of Sampling-Based Approaches to the Calculation of Posterior Moments. *In Bayesian Statistics 4*, Bernardo, J. M., Berger, J. O., Dawid, A. P. and Smith, A. F. M. (eds.), 169-193. Oxford: Oxford University Press.

Golubov, A., Petmezas, D., & Travlos, N. G. (2012). When It Pays to Pay Your Investment Banker: New Evidence on the Role of Financial Advisors in M&As. *Journal of Finance, 67*(1), 271-311.

Golubov, A., Petmezas, D., & Travlos, N. G. (2016). Do Stock-Financed Acquisitions Destroy Value? New Methods and Evidence. *Review of Finance*, *20*(1), 161-200.

Golubov, A., Yawson, A., & Zhang, H. (2015). Extraordinary Acquirers. *Journal of Financial Economics*, *116*(2), 314-330.

Gompers, P., Ishii, J., & Metrick, A. (2003). Corporate Governance and Equity Prices. *Quarterly Journal of Economics*, *118*(1), 107-156.

Gompers, P., Kovner, A., Lerner, J., & Scharfstein, D. (2010). Performance Persistence in Entrepreneurship. *Journal of Financial Economics*, 96(1), 18-32.

Greene, W. H. (2008). The Econometric Approach to Efficiency Analysis. In: The Measurement of Productive Efficiency and Productivity Growth, pp. 92-250. Oxford University Press, UK.

Harford, J., Humphery-Jenner, M., & Powell, R. (2012). The Sources of Value Destruction in Acquisitions by Entrenched Managers. *Journal of Financial Economics, 106*(2), 247-261.

Harris, M., & Holmstrom, B. (1982). A Theory of Wage Dynamics. *Review of Economic Studies*, 49(3), 315-333.

Hayward, M. L. A. (2002). When do Firms Learn from their Acquisition Experience? Evidence from 1990 to 1995. *Strategic Management Journal, 23*(1), 21-39.

Hayes, R. M., & Schaefer, S. (1999). How much are differences in managerial ability worth? *Journal of Accounting and Economics*, 27(2), 125-148.

Hermalin, B. E., & Weisbach, M. S. (1998). Endogenously Chosen Boards of Directors and their Monitoring of the CEO. *American Economic Review*, 96-118.

Hicks, J. R. (1935). Annual Survey of Economic Theory: The Theory of Monopoly. *Econometrica*, 3, 1-20.

Huselid, M. A. (1995). The Impact Of Human Resource Management Practices On Turnover, Productivity, And Corporate Financial Performance. Academy of Management Journal, 38, 635-672.

Jaffe, J., Pedersen, D., & Voetmann, T. (2013). Skill Differences in Corporate Acquisitions. *Journal of Corporate Finance*, 23, 166-181.

Jensen, M. C. (2005). Agency Costs of Overvalued Equity. *Financial Management, 34*(1), 5-19.

Kaplan, S. N., Klebanov, M. M., & Sorensen, M. (2012). Which CEO characteristics and abilities matter? *Journal of Finance*, 67(3), 973-1007.

Katz, R. (1974). Skills of an Effective Administrator. *Harvard Business Review*, September.

Kor, Y. Y., Mesko, A. (2013). Dynamic Managerial Capabilities: Configuration and Orchestration of Top Executives' Capabilities and the Firm's Dominant Logic. *Strategic Management Journal*, 34, 233-244.

Lang, L. H., Stulz, R. M., & Walkling, R. A. (1989). Managerial Performance, Tobin's q, and the Gains from Successful Tender Offers. *Journal of Financial Economics* 24, 137-154.

Lang, L. H., & Stulz, R. M. (1994). Tobin's q, Corporate Diversification, and Firm Performance. *Journal of Political Economy*, *102*(6), 1248-1280.

Li, X. (2013). Productivity, Restructuring, and the Gains from Takeovers. *Journal of Financial Economics*, 109(1), 250-271.

Loughran, T., & Ritter, J. (2004). Why Has IPO Underpricing Changed Over Time? *Financial Management, 33*(3), 5-37.

Lucas, R. (1978). On the Size Distribution of Business Firms. *Bell Journal of Economics, 9*(2), 508-523.

Maksimovic, V., & Phillips, G. (2001). The Market for Corporate Assets: Who Engages in Mergers and Asset Sales and Are There Efficiency Gains?. *Journal of Finance*, 56(6), 2019-2065.

Masulis, R. W., Wang, C., & Xie, F. (2007). Corporate Governance and Acquirer returns. *Journal of Finance, 62*(4), 1851-1889.

McDonald, M. L., Westphal, J. D., & Graebner, M. E. (2008). What do they Know? The Effects of Outside Director Acquisition Experience on Firm Acquisition Performance. *Strategic Management Journal 29*(11), 1155-1177.

Melitz, M. (2003). The Impact of Trade on Intra-Industry Reallocations and Aggregate Productivity Growth. *Econometrica, 71*(6), 1695-1725.

Myers, S. C., & Majluf, N. S. (1984). Corporate Financing and Investment Decisions when Firms Have Information that Investors do not Have. *Journal of Financial Economics, 13*(2), 187-221.

Moeller, S. B., Schlingemann, F. P., & Stulz, R. M. (2004). Firm Size and the Gains from Acquisitions. *Journal of Financial Economics, 73*(2), 201-228.

Moeller, S. B., Schlingemann, F. P., & Stulz, R. M. (2005). Wealth destruction on a massive scale? A study of acquiring-firm returns in the recent merger wave. *Journal of Finance*, 60(2), 757-782.

Morosini, P., Shane, S., & Singh, H. (1998). National cultural distance and cross-border acquisition performance. *Journal of International Business Studies*, 29(1), 137-158.

Nevo, A. (2001). Measuring Market Power in the Ready-to-Eat Cereal Industry. *Econometrica, 69*(2), 307-342.

Rajan, R., Servaes, H., & Zingales, L. (2000). The Cost of Diversity: The Diversification Discount and Inefficient Investment. *Journal of Finance, 55*(1), 35-80.

Rajamani, A., van der Poel, M., de Jong, A., & Ongena, S. (2016). The International Diversification of Banks and the Value of Their Cross-Border M&A Advice. *Management Science*, 63(7), 2211-2232.

Samuelson, P. A., Nordhaus, W. D. (2009). Economics. McGraw-Hill, 19th edition, New York, U.S.

Scharfstein, D. S., & Stein, J. C. (2000). The Dark Side of Internal Capital Markets: Divisional Rent-Seeking and Inefficient Investment. *Journal of Finance, 55*(6), 2537-2564.

Silva, A. C. (2010). Managerial Ability and Capital Flows. *Journal of Development Economics*, 93(1), 126-136.

Simar, L., Wilson, P. W. (2007). Estimation and Inference in Two-Stage, Semi-parametric Models of Production Processes. *Journal of Econometrics*, 136, 31-64.

Stein, J. C. (1997). Internal Capital Markets and the Competition for Corporate Resources. *Journal of Finance, 52*(1), 111-133.

Terviö, M. (2008). The Difference that CEOs Make: An Assignment Model Approach. *American Economic Review, 98*(3), 642-668.

Travlos, N. G. (1987). Corporate Takeover Bids, Methods of Payment, and Bidding Firms' Stock Returns. *Journal of Finance, 42*(4), 943-963.

Wang, C., & Xie, F. (2008). Corporate Governance Transfer and Synergistic Gains from Mergers and Acquisitions. *Review of Financial Studies, 22*(2), 829-858

Table 1: Variable definitions and data sources

Variable	Description
Return variables and antitakeover indexes	
CAR (-2, +2) – acquirer	Five-day cumulative abnormal return (CAR) of acquirer firm's stock, i.e. in the (-2, +2) days surrounding the announcement date. CAR is calculated using the market model and the benchmark is the CRSP value weighted index. Model parameters are estimated over (-300, -91) days before the announcement.
CAR (-2, +2) – target	Five-day cumulative abnormal return (CAR) of target firm's stock, i.e. in the (-2, +2) days surrounding the announcement date. CAR is calculated using the market model and the benchmark is the CRSP value weighted index. Model parameters are estimated over (-300, -91) days before the announcement
Synergy CAR (-2, +2)	Five-day cumulative abnormal return for both the acquirer and the target for a value-weighted portfolio. CAR is calculated using the market model and model parameters are estimated over (-300, -91) days before the announcement. Acquirer' and target's weights are based on their market capitalization six trading days before the announcement (see Bradley, Desai, and Kim, 1988).
GIM index	The Governance Index of Gompers et al. (2003) that accounts for 24 anti-takeover provisions.
E-Index	The entrenchment index based on Bebchuk et al. (2009).
Bidder characteristics	
Management practices	Estimates of good management practices obtained from a production function and the method of Delis and Tsionas (2018).
Ln(acquirer size)	The natural logarithm of the market value of a firm's equity 11 days prior to the M&A announcement date. The data are in million dollars and are obtained from CRSP.
Run-up	Bidder's market-adjusted buy-and-hold return for the window (-210, -11) days. Data are from CRSP.
Sigma	Standard deviation of a bidder's market-adjusted daily returns for the time window (-210, -11). Data are from CRSP.
Free cash flow	[(Operating income before depreciation - total interest and related expenses - total income taxes - capital expenditures)/(close price x common shares outstanding)]. In Compustat coding: [(oibdp - xint - txt -capx)/(prcc_c (x) csho)].
Tobin's q	The calculation of Tobin's q in Compustat is: [at + csho (x) prcc_f – ceq]/at. The values are taken for the fiscal year prior to the acquisition.
Leverage	(Total debt in current liabilities + long-term debt)/total assets (Compustat: (dlc + dltt)/at].
Tech	= 1 if both the bidder and the target belong to high tech industries. Based on Loughran and Ritter (2004), Faccio and Masulis (2005), Masulis et al. (2007), and Harford et al. (2012) tech firms have the following four digit SIC codes: 3572, 3575, 3577, 3578, 3661, 3663, 3669, 3671, 3672, 3674, 3675, 3677, 3678, 3679, 3812, 3823, 3825, 3826, 3827, 3829, 4812, 4813, 4899, 7371, 7372, 7373, 7374, 7375, 7378, 7379.
Tech target	= 1 if the target belongs to a high tech industry (as defined above) and = 0 otherwise.
Conglomerate	= 1 if the acquirer and the target are in different Fama-French industries and = 0 otherwise.
R&D intensity	R&D expenses divided by total assets (Compustat: xrd/ta).
R&D high	= 1 if R&D intensity for a specific firm is above the industry median and = 0 otherwise.
ROA	Earnings before interest and taxes over total assets (Compustat: ebit/at). The values are computed in the fiscal year prior to the acquisition.

Low_ROA	= 1 if the ROA of a firm is lower than the average of the sector and = 0 otherwise. The values are computed for the fiscal year prior to the acquisition.
ROE	Net income over total assets (Compustat: ni/at). The values are computed for the fiscal year prior to the acquisition.
Annual stock return	A firm's stock return on a yearly basis. It is calculated using Compustat data in the following manner: [(prcc_f(t)/ajex(t) + dvpsx_f(t)/ ajex(t))/(prcc_f(t-1)/ajex_f(t-1))]. See also Custódio et al. (2013).
CAPX	Capital expenditures over total assets (Compustat: capx/at).
Net profit margin	Net income over sales (Compustat: ni/sale).
Industry sales Herfindahl	As in Custódio et al. (2013), this Herfindahl index is based on a firm's sales. The computation utilizes Compustat's SALE variable. Computations are based on the two-digit SIC industry codes.
Deal characteristics	
Relative size	The deal value (from Thomson One Banker) divided by the market value (CRSP) 11 days prior to the deal announcement.
Relatedness	= 1 if bidder and target are in the same two-digit SIC code and = 0 otherwise. Data are from Thomson One Banker.
Friendly merger	= 1 if the merger is characterized as such in Thomson One Banker and = 0 otherwise.
Hostile merger	Same as above.
Neutral merger	Same as above.
Public (cash)	= 1 for acquisition of public targets that have been financed with cash and = 0 otherwise. Data are from Thomson One Banker.
Public (stock)	= 1 for acquisition of public targets that have been financed with stock and = 0 otherwise. Data are from Thomson One Banker.
Private (cash)	= 1 for acquisition of private targets that have been financed with cash and = 0 otherwise. Data are from Thomson One Banker.
Private (stock)	= 1 for acquisition of private targets that have been financed with stock and = 0 otherwise. Data are from Thomson One Banker.
Subsidiary (cash)	= 1 if acquisition of a subsidiary target that have been finance with cash and = 0 otherwise. Data are from Thomson One Banker.
CEO and management team characteristics	
Above vice-president	The number of people who are in a position above that of a vice-president in the fiscal year prior to the M&A announcement (calculation based on Execucomp data).
Age1	The average age of the individuals who are above the position of the vice-president in the fiscal year prior to the announcement date (data from Execucomp).
Age2	Executive age in the year prior to the announcement date (data from Compustat).
Cash pay	Total current compensation (Execucomp: total_curr).
Total pay	Total pay for the CEO in thousands of dollars (Execucomp: tdc1).
Equity pay	Restricted stock granted + options granted (in thousands of dollars). In Execucomp: rstkgrnt + option_awards_blk_value.

Table 2: Summary statistics

Variable	Mean	Median	Std. Dev.	Min	Max	Obs.
CAR (-2, +2) -- acquirer	0.014	0.008	0.090	-0.663	1.486	8,106
CAR (-1, +1) -- acquirer	0.013	0.006	0.080	-0.675	1.456	8,106
CAR (-5, +5) -- acquirer	0.014	0.009	0.116	-0.972	1.603	8,106
CAR (-2, +2) -- target	0.257	0.217	0.254	-1.124	2.910	1,050
CAR (-1, +1) -- target	0.248	0.210	0.254	-0.988	3.044	1,050
CAR (-5, +5) -- target	0.278	0.239	0.259	-0.274	2.677	1,050
CAR (-2, +2) -- synergy	0.022	0.015	0.081	-0.352	0.458	1,050
CAR (-1, +1) -- synergy	0.022	0.014	0.077	-0.333	0.450	1,050
CAR (-5, +5) -- synergy	0.025	0.020	0.097	-0.423	0.459	1,049
GIM index	9.298	9	2.718	2	17	799
E-index	2.402	2	1.249	0	6	1,003
Management practices	1.512	1.513	0.299	0.421	3.101	8,106
Ln(acquirer size)	6.260	6.238	1.876	0.412	12.978	8,106
Run-up	0.122	0.099	0.224	-0.994	2.030	8,106
Sigma	0.030	0.027	0.016	0.007	0.192	8,106
Free cash flow	0.003	0.033	0.229	-10.977	2.423	8,106
Tobin's Q	2.164	1.639	2.324	0.258	48.839	8,106
Leverage	0.219	0.190	0.201	0	1.406	8,106
TECH	0.219	0	0.413	0	1	8,106
TECH target	0.272	0	0.445	0	1	8,106
Conglomerate	0.400	0	0.490	0	1	8,106
RD intensity	0.061	0.034	0.080	0	1.124	4,842
ROA	0.085	0.096	0.130	-2.112	0.590	8,106
ROE	0.034	0.000	0.145	-3.007	0.445	8,106
Annual stock return	1.363	0.053	8.246	0.004	730.446	7,889
CAPX_AT	0.065	1.095	0.082	0	1.978	8,102
Net profit margin	-0.074	0.042	3.357	-285.696	6.978	8,100
Industry sales Herfindahl	0.293	0.050	0.244	0	1	8,106
Relative size	0.231	0.216	0.523	0.01	23.261	8,106
Relatedness	0.600	0.090	0.490	0	1	8,106
Friendly merger	0.994	1	0.074	0	1	8,106
Hostile merger	0.003	1	0.059	0	1	8,106
Neutral merger	0.001	0	0.038	0	1	8,106
Public (paid with cash)	0.054	0	0.225	0	1	8,106
Public (paid with stocks)	0.046	0	0.210	0	1	8,106
Private (paid with cash)	0.119	0	0.324	0	1	8,106
Private (paid with stocks)	0.067	0	0.250	0	1	8,106
Subsidiary (paid with cash)	0.124	0	0.330	0	1	8,106
Above vice-president	4.743	5	1.523	1	11	3,721
Average age (above vice-president)	64.755	64	7.777	32	94	3,513
Average age (executives)	53.167	53	5.595	35.667	78	3,112
Cash pay for CEO (in thousand)	1,195.826	858.617	1,899.304	2.535	36,812.51	3,351
Total pay for CEO (in thousand)	5,178.175	2,866.143	8,625.244	10	140,724.30	3,330
Equity pay for CEO (in thousand)	2,984.136	909.242	8,540.830	0	140,340.80	2,032

Table 3: **Percentile statistics**

This table reports distribution characteristics for management practices and acquirer CAR measured over different time windows (2 days, 5 days, and 11 days). CAR is calculated based on the market model. We report characteristics for the whole sample, for frequent acquirers and for occasional acquirers. Definitions of all variables along with their sources are in Table 1.

Statistics	Management practices	CAR (-1, +1)	CAR (-2, +2)	CAR (-5, +5)
Panel A: Whole sample				
1st percentile	0.970	-0.184	-0.208	-0.282
5th percentile	1.049	-0.090	-0.111	-0.155
10th percentile	1.109	-0.058	-0.074	-0.104
25th percentile	1.260	-0.021	-0.028	-0.042
50th percentile (median)	1.513	0.006	0.008	0.009
75th percentile	1.757	0.042	0.050	0.064
90th percentile	1.918	0.095	0.109	0.138
95th percentile	1.974	0.136	0.158	0.197
99th percentile	2.076	0.251	0.282	0.353
p75-p25 (interquartile range)	0.496	0.063	0.077	0.105
Panel B: Frequent acquirers				
1st percentile	0.989	-0.158	-0.197	-0.290
5th percentile	1.068	-0.089	-0.116	-0.164
10th percentile	1.117	-0.061	-0.078	-0.109
25th percentile	1.285	-0.021	-0.028	-0.043
50th percentile (median)	1.507	0.009	0.008	0.009
75th percentile	1.757	0.044	0.052	0.063
90th percentile	1.918	0.097	0.108	0.140
95th percentile	1.976	0.128	0.159	0.207
99th percentile	2.085	0.248	0.279	0.344
p75-p25 (interquartile range)	0.472	0.065	0.081	0.106
Panel B: Occasional acquirers				
1st percentile	0.976	-0.174	-0.205	-0.274
5th percentile	1.057	-0.088	-0.108	-0.153
10th percentile	1.115	-0.057	-0.073	-0.103
25th percentile	1.262	-0.020	-0.028	-0.040
50th percentile (median)	1.509	0.006	0.007	0.009
75th percentile	1.757	0.040	0.049	0.063
90th percentile	1.918	0.092	0.107	0.133
95th percentile	1.973	0.132	0.155	0.193
99th percentile	2.060	0.236	0.266	0.317
p75-p25 (interquartile range)	0.495	0.061	0.077	0.103

Table 4: Benchmark regressions (without management)

This table reports OLS results from the estimation of equation (9) without management practices. The dependent variable is the bidder's CAR, based on a two-day event window (-2, +2) around the announcement date. The results are for the whole sample, for frequent acquirers (acquirers who have completed at least five acquisitions within a three-year event window), and for occasional acquirers (acquirers who have completed at least two acquisitions within a three-year period). CAR calculation is based on the market model. The t-statistics are clustered at the firm level (acquirer). Stars ***, **, * denote statistical significance at the 1%, 5%, and 10% levels, respectively. All regressions include a constant term. Definitions of all variables along with their sources are in Table 1.

	Whole sample	Frequent	Occasional
	(1)	(2)	(3)
Ln (acquirer size)	-0.0045***	-0.0076***	-0.0051***
	(-6.22)	(-4.08)	(-6.38)
Run-up	-0.0139**	-0.0151	-0.0154**
	(-2.00)	(-1.03)	(-2.06)
Sigma	0.2168	0.0798	0.0235
	(1.39)	(0.25)	(0.18)
Relative size	0.0180***	0.0135	0.0138***
	(3.46)	(1.34)	(2.87)
Relatedness	0.0042**	-0.0056	0.0042*
	(2.12)	(-1.11)	(1.84)
Friendly merger	0.0117	-0.0399***	0.0066
	(0.47)	(-6.92)	(0.17)
Hostile merger	0.0099	-0.0446	-0.0035
	(0.35)	(-1.59)	(-0.08)
Neutral merger	0.0230	-0.0687***	-0.0073
	(0.61)	(-7.03)	(-0.17)
Public (cash)	0.0037	0.0009	0.0042
	(1.01)	(0.08)	(0.92)
Public (stock)	-0.0288***	-0.0357***	-0.0307***
	(-5.71)	(-3.33)	(-5.09)
Private (cash)	0.0011	0.0057	0.0003
	(0.40)	(0.78)	(0.10)
Private (stock)	0.0176***	0.0077	0.0190***
	(3.46)	(0.85)	(3.23)
Subsidiary (cash)	0.0104***	-0.0079	0.0073**
	(3.48)	(-0.91)	(2.08)
Free cash flow	0.0014	0.0125***	0.0064
	(0.26)	(3.69)	(1.39)
Tobin's q	-0.0021***	-0.0008	-0.0018***
	(-3.78)	(-0.95)	(-3.21)
Leverage	0.0103*	0.0022	0.0023
	(1.75)	(0.21)	(0.36)
Observations	8,106	1,319	5,487
R-squared	0.045	0.047	0.039
Adjusted R-squared	0.043	0.036	0.036

Table 5: Benchmark model with management

This table reports OLS results from the estimation of equation (9) with management practices. The dependent variable is the bidder's CAR, based on a two-day event window (-2, +2) around the announcement date. The results are for the whole sample, for frequent acquirers (acquirers who have completed at least five acquisitions within a three-year event window), and for occasional acquirers (acquirers who have completed at least two acquisitions within a three-year period). CAR calculation is based on the market model. The t-statistics are clustered at the firm level (acquirer). Stars ***, **, * denote statistical significance at the 1%, 5%, and 10% levels, respectively. The last three specifications include firm and year fixed effects. All regressions include a constant term. Definitions of all variables along with their sources are in Table 1.

	Whole sample	Frequent	Occasional	Whole sample	Frequent	Occasional
	(1)	(2)	(3)	(4)	(5)	(6)
Management practices	0.0660***	0.0583***	0.0542***	0.0513***	0.0564***	0.0490***
	(13.51)	(6.48)	(12.07)	(11.72)	(6.11)	(9.37)
Ln (acquirer size)	-0.0044***	-0.0072***	-0.0050***	-0.0113***	-0.0230***	-0.0159***
	(-6.28)	(-4.05)	(-6.48)	(-4.69)	(-3.99)	(-4.80)
Run-up	-0.0137**	-0.0106	-0.0151**	-0.0113	-0.0073	-0.0073
	(-2.06)	(-0.79)	(-2.09)	(-1.39)	(-0.42)	(-0.76)
Sigma	0.1939	0.0336	0.0145	0.0348	-0.2746	-0.0463
	(1.33)	(0.12)	(0.11)	(0.19)	(-0.56)	(-0.19)
Relative size	0.0172***	0.0100	0.0134***	0.0147***	0.0150	0.0092*
	(3.48)	(1.09)	(2.89)	(3.06)	(1.54)	(1.74)
Relatedness	0.0040**	-0.0054	0.0040*	0.0015	-0.0111	0.0011
	(2.05)	(-1.11)	(1.79)	(0.57)	(-1.51)	(0.37)
Friendly merger	0.0095	-0.0331***	0.0059	0.0024	-0.0244	0.0156
	(0.34)	(-5.61)	(0.13)	(0.07)	(-1.50)	(0.39)
Hostile merger	0.0088	-0.0379	-0.0054	-0.0034	-0.0194	0.0123
	(0.28)	(-1.33)	(-0.11)	(-0.09)	(-0.75)	(0.27)
Neutral merger	0.0206	-0.0476***	-0.0093	0.0043	-0.0650**	0.0157
	(0.53)	(-4.49)	(-0.19)	(0.11)	(-2.26)	(0.33)
Public (cash)	0.0042	0.0046	0.0052	0.0006	0.0117	0.0063
	(1.15)	(0.45)	(1.13)	(0.14)	(1.01)	(1.19)
Public (stock)	-0.0281***	-0.0370***	-0.0303***	-0.0250***	-0.0419***	-0.0269***
	(-5.70)	(-3.58)	(-5.11)	(-4.04)	(-3.48)	(-3.69)
Private (cash)	0.0012	0.0069	0.0004	-0.0009	0.0029	0.0013
	(0.44)	(0.94)	(0.13)	(-0.24)	(0.33)	(0.31)
Private (stock)	0.0167***	0.0054	0.0178***	0.0167***	0.0002	0.0202***
	(3.37)	(0.62)	(3.12)	(2.63)	(0.02)	(2.76)
Subsidiary (cash)	0.0088***	-0.0081	0.0062*	0.0023	-0.0174*	0.0005
	(3.03)	(-0.95)	(1.78)	(0.71)	(-1.68)	(0.11)
Free cash flow	0.0010	0.0112***	0.0050	0.0055	0.0088**	0.0066
	(0.21)	(3.13)	(1.09)	(1.32)	(2.55)	(1.37)
Tobin's q	-0.0020***	-0.0009	-0.0018***	-0.0016*	-0.0011	-0.0017*
	(-3.73)	(-1.01)	(-3.07)	(-1.72)	(-0.70)	(-1.68)
Leverage	0.0105*	0.0036	0.0035	-0.0072	-0.0395	-0.0239
	(1.83)	(0.34)	(0.56)	(-0.62)	(-1.35)	(-1.61)
Firm FE	No	No	No	Yes	Yes	Yes
Year FE	No	No	No	Yes	Yes	Yes
Observations	8,106	1,319	5,487	6,922	1,273	5,317
R-squared	0.093	0.086	0.074	0.347	0.294	0.346
Adjusted R-squared	0.091	0.074	0.071	0.125	0.101	0.110

Table 6: Controls for governance indices

This table reports OLS results from the estimation of equation (9) with management practices and additional controls for governance indices developed by Gompers et al. (2003) and Bebchuk et al. (2009). The dependent variable is the bidder's CAR, based on a two-day event window (-2, +2) around the announcement date. The results are for the whole sample. CAR calculation is based on the market model. The t-statistics are clustered at the firm level (acquirer). Stars ***, **, * denote statistical significance at the 1%, 5%, and 10% levels, respectively. All regressions include a constant term and firm and year fixed effects. Definitions of all variables along with their sources are in Table 1.

	(1)	(2)	(3)
Management practices	0.0469***	0.0369***	0.0404***
	(3.54)	(3.63)	(3.59)
G-index	-0.0040		-0.0032
	(-0.79)		(-0.62)
E-index		0.0121	0.0069
		(1.49)	(0.75)
Bidder characteristics	Yes	Yes	Yes
Deal characteristics	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Observations	542	655	494
R-squared	0.481	0.482	0.466
Adjusted R-squared	0.160	0.154	0.127

Table 7: Controls for management characteristics

This table reports OLS results from the estimation of equation (9) with management practices and additional controls for management characteristics. The dependent variable is the bidder's CAR, based on a two-day event window (-2, +2) around the announcement date. The results are for the whole sample. CAR calculation is based on the market model. The t-statistics are clustered at the firm level (acquirer). Stars ***, **, * denote statistical significance at the 1%, 5%, and 10% levels, respectively. The last three specifications include firm and year fixed effects. All regressions include a constant term. Definitions of all variables along with their sources are in Table 1.

	(1)	(2)	(3)	(4)	(5)	(6)
Management practices	0.0513***	0.0345***	0.0347***	0.0341***	0.0338***	0.0362***
	(11.72)	(5.94)	(5.99)	(5.85)	(5.82)	(4.22)
Average age (above VP)		-0.0005	-0.0006	-0.0006	-0.0007	-0.0008
		(-0.98)	(-1.15)	(-1.23)	(-1.33)	(-1.09)
Average age (executives)		0.0005	0.0006	0.0006	0.0006	0.0004
		(0.82)	(0.95)	(0.95)	(0.99)	(0.49)
# above vice-president			-0.0025	-0.0024	-0.0026*	-0.0033
			(-1.63)	(-1.56)	(-1.70)	(-1.43)
Cash pay				0.0000	0.0000	0.0000
				(0.60)	(0.33)	(1.55)
Total pay					0.0000	-0.0000
					(0.87)	(-0.84)
Equity pay						0.0000
						(1.05)
Bidder characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Deal characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,922	2,733	2,733	2,720	2,701	1,586
R-squared	0.347	0.359	0.360	0.349	0.350	0.385
Adjusted R-squared	0.125	0.131	0.131	0.115	0.115	0.117

Table 8: Controls for firm performance

This table reports OLS results from the estimation of equation (9) with management practices and additional controls for firm performance in the fiscal year prior to the acquisition. The dependent variable is the bidder's CAR, based on a two-day event window (-2, +2) around the announcement date. The results are for the whole sample. CAR calculation is based on the market model. The t-statistics are clustered at the firm level (acquirer). Stars ***, **, * denote statistical significance at the 1%, 5%, and 10% levels, respectively. The last three specifications include firm and year fixed effects. All regressions include a constant term. Definitions of all variables along with their sources are in Table 1.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Management practices	0.0513***	0.0513***	0.0513***	0.0500***	0.0513***	0.0508***	0.0511***	0.0495***	0.0494***
	(11.72)	(11.72)	(11.71)	(11.39)	(11.71)	(11.67)	(11.68)	(11.34)	(11.31)
ROA	0.0054							0.0434	
	(0.22)							(1.46)	
Low ROA		0.0014						0.0054	
		(0.43)						(1.37)	
ROE			0.0115						0.0415*
			(0.58)						(1.89)
Annual stock return				-0.0000				-0.0000	-0.0000*
				(-1.57)				(-1.58)	(-1.75)
CAPX					-0.0084			-0.0099	-0.0085
					(-0.42)			(-0.49)	(-0.43)
Net profit margin						-0.0111**		-0.0124***	-0.0136***
						(-2.55)		(-2.70)	(-2.81)
Industry sales Herfindahl							-0.0150**	-0.0125*	-0.0118*
							(-2.26)	(-1.94)	(-1.82)
Bidder characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Deal characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,922	6,922	6,922	6,735	6,920	6,917	6,922	6,728	6,728
R-squared	0.347	0.347	0.347	0.348	0.347	0.350	0.347	0.352	0.352
Adjusted R-squared	0.125	0.125	0.125	0.128	0.125	0.129	0.126	0.133	0.134

Table 9: Controls for industry characteristics

This table reports OLS results from the estimation of equation (9) with management practices and additional controls for industry characteristics. The dependent variable is the bidder's CAR, based on a two-day event window (-2, +2) around the announcement date. The results are for the whole sample. CAR calculation is based on the market model. The t-statistics are clustered at the firm level (acquirer). Stars ***, **, * denote statistical significance at the 1%, 5%, and 10% levels, respectively. The last three specifications include firm and year fixed effects. All regressions include a constant term. Definitions of all variables along with their sources are in Table 1.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Management practices	0.0514***	0.0514***	0.0514***	0.0514***	0.0615***	0.0615***	0.0612***
	(11.64)	(11.64)	(11.59)	(11.62)	(10.22)	(10.22)	(10.14)
Conglomerate		-0.0008					-0.0027
		(-0.19)					(-0.48)
TECH (target)			-0.0071				-0.0147
			(-1.21)				(-1.62)
TECH (both)				-0.0015			0.0094
				(-0.22)			(0.96)
RD intensity					-0.0717		-0.0982*
					(-1.28)		(-1.69)
RD high						0.0035	0.0083
						(0.62)	(1.42)
Bidder characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Deal characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fama-French FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,917	6,917	6,917	6,917	4,064	4,064	4,064
R-squared	0.354	0.354	0.354	0.354	0.391	0.390	0.392
Adjusted R-squared	0.121	0.120	0.121	0.120	0.145	0.144	0.145

Table 10: **Alternative CARs**.

This table reports OLS results from the estimation of equation (9) with management practices. Instead of acquirer's CAR (-2, +2), we now use CAR (-1, +1) and CAR (-5, +5). Each numbered line corresponds to a column in the previous tables. Specifically, lines [1] to [6] of *Panel A* correspond to columns (1) to (6) of Table 5. Lines [7] to [10] correspond to the last column of the Tables 6, 7, 8, and 9 respectively. Similarly, for *Panel B*. We report t-stats (clustered at the acquirer level) in parentheses. Stars ***, **, * denote statistical significance at the 1%, 5%, and 10% levels, respectively. All regressions include a constant term. Definitions of all variables along with their sources are in Table 1.

		Coef.	t-stat	R^2	R^2-adjusted	Obs.
	Panel A: CAR (-1, +1)					
[1]	Full sample, FE = No	0.0709***	14.24	0.116	0.115	8,106
[2]	Frequent, FE = No	0.0593***	7.54	0.111	0.100	1,319
[3]	Occasional, FE = No	0.0587***	14.34	0.099	0.096	5,487
[4]	Full sample, FE = Yes	0.0548***	13.79	0.374	0.162	6,922
[5]	Frequent, FE = Yes	0.0587***	7.53	0.327	0.142	1,273
[6]	Occasional, FE = Yes	0.0524***	11.23	0.377	0.153	5,317
[7]	Governance	0.0372***	3.76	0.475	0.143	494
[8]	Management	0.0407***	5.68	0.424	0.172	1586
[9]	Firm performance	0.0529***	13.37	0.380	0.171	6728
[10]	Industry characteristics	0.0620***	11.51	0.418	0.182	4064
	Panel B: CAR (-5, +5)					
[11]	Full sample, FE = No	0.0624***	10.94	0.072	0.070	8,106
[12]	Frequent, FE = No	0.0687***	5.47	0.076	0.064	1,319
[13]	Occasional, FE = No	0.0522***	9.41	0.058	0.055	5,487
[14]	Full sample, FE = Yes	0.0459***	8.92	0.353	0.134	6,922
[15]	Frequent, FE = Yes	0.0558***	4.88	0.346	0.166	1,273
[16]	Occasional, FE = Yes	0.0446***	7.33	0.367	0.140	5,317
[17]	Governance	0.0376***	2.75	0.463	0.123	494
[18]	Management	0.0302***	3.01	0.377	0.106	1586
[19]	Firm performance	0.0434***	8.45	0.353	0.135	6,728
[20]	Industry characteristics	0.0556***	7.83	0.388	0.139	4064

Table 11: **Winsorized results**

This table reports OLS results from the estimation of equation (9) with management practices. All variables (except dummies) have been winsorized at the 1% level at both ends. Each numbered line corresponds to a column in the previous tables. Specifically, lines [1] to [6] of *Panel A* correspond to columns (1) to (6) of Table 5. Lines [7] to [10] correspond to the last column of the Tables 6, 7, 8, and 9 respectively. Similarly, for *Panel B*. We report t-stats (clustered at the acquirer level) in parentheses. Stars ***, **, * denote statistical significance at the 1%, 5%, and 10% levels, respectively. All regressions include a constant term. Definitions of all variables along with their sources are in Table 1.

		Coef.	t-stat	R^2	R^2-adjusted	Obs.
	Dependent variable: acquirer CAR (-2, +2)					
[1]	MA: Full sample, FE = No	0.0356***	14.78	0.063	0.061	8,225
[2]	MA: Frequent acquirers, FE = No	0.0352***	5.52	0.068	0.056	1,364
[3]	MA: Occasional acquirers, FE = No	0.0331***	11.29	0.057	0.055	5,605
[4]	MA: Full sample, FE = Yes	0.0312***	10.56	0.319	0.091	7,044
[5]	MA: Frequent acquirers, FE = Yes	0.0368***	5.16	0.258	0.059	1,320
[6]	MA: Occasional acquirers, FE = Yes	0.0300***	8.84	0.323	0.082	5,438
[7]	MA (governance)	0.0417***	3.83	0.439	0.090	507
[8]	MA (management team)	0.0239***	4.12	0.349	0.070	1618
[9]	MA (sales and assets)	0.0451***	10.42	0.347	0.129	6843
[10]	MA (tech and industry)	0.0357***	9.1	0.364	0.111	4147

Table 12: Benchmark model with management and synergies

This table reports OLS results from the estimation of equation (9) for the whole sample. The dependent variable is synergistic CARs for acquirer and target. These are computed based on the market model with their respective weights based on their market capitalizations six days prior to the day of announcement. The t-statistics are clustered at the acquirer level. Stars ***, **, * denote statistical significance at the 1%, 5%, and 10% levels. All regressions include a constant term. Definitions of all variables along with their sources are in Table 1.

	Synergy CAR(-1, +1)		Synergy CAR(-2, +2)		Synergy CAR(-5, +5)	
Management practices	0.0471***	0.0496***	0.0485***	0.0518***	0.0452***	0.0485***
	(5.66)	(5.95)	(5.52)	(5.81)	(4.61)	(4.85)
Ln (acquirer size)	-0.0062***	-0.0092***	-0.0066***	-0.0094***	-0.0071***	-0.0102***
	(-4.94)	(-5.79)	(-4.72)	(-5.33)	(-4.60)	(-5.12)
Run-up	-0.0296*	-0.0261	-0.0375**	-0.0361**	-0.0517**	-0.0509**
	(-1.90)	(-1.61)	(-2.42)	(-2.28)	(-2.35)	(-2.26)
Sigma	-0.4376	-0.6075*	-0.3046	-0.3842	0.0378	-0.1806
	(-1.58)	(-1.67)	(-1.03)	(-1.00)	(0.11)	(-0.43)
Relative size	0.0157***	0.0139***	0.0135***	0.0115***	0.0180***	0.0164***
	(4.70)	(5.07)	(3.96)	(4.17)	(6.55)	(6.44)
Relatedness	0.0121***	0.0099**	0.0125***	0.0098**	0.0183***	0.0153***
	(2.84)	(2.31)	(2.74)	(2.15)	(3.34)	(2.77)
Friendly merger	-0.0205	-0.0104	-0.0114	0.0025	0.0043	0.0079
	(-0.45)	(-0.31)	(-0.20)	(0.06)	(0.05)	(0.09)
Hostile merger	0.0151	0.0397	0.0256	0.0529	0.0261	0.042
	(0.32)	(1.12)	(0.45)	(1.12)	(0.29)	(0.49)
Public (cash)	0.0190***	0.0137**	0.0175***	0.0117*	0.0203***	0.0138**
	(3.65)	(2.36)	(3.19)	(1.91)	(3.27)	(2.02)
Public (stock)	-0.0127**	-0.0147**	-0.0106	-0.0130*	-0.0112	-0.0160*
	(-2.10)	(-2.28)	(-1.61)	(-1.81)	(-1.38)	(-1.84)
Private (cash)	0.0501	0.0425	0.0640***	0.0569***	0.1263***	0.1168***
	(1.57)	(1.33)	(3.10)	(2.68)	(9.66)	(8.01)
Private (stock)	0.0876***	0.0827***	-0.0033	-0.0066	-0.0777***	-0.0729***
	(10.92)	(5.45)	(-0.39)	(-0.42)	(-7.78)	(-3.70)
Subsidiary (cash)	0.0339	0.0325	0.0308*	0.0279	0.0239	0.0268
	(1.25)	(1.04)	(1.65)	(1.19)	(0.67)	(0.67)
Free cash flow	0.0284	0.0165	0.0281*	0.0167	0.0199	0.0052
	(1.64)	(1.00)	(1.73)	(1.04)	(1.00)	(0.24)
Tobin's q	-0.0055***	-0.0053***	-0.0058***	-0.0058***	-0.0073***	-0.0077***
	(-3.89)	(-3.73)	(-4.05)	(-4.30)	(-3.48)	(-3.73)
Leverage	0.0114	0.0046	0.0234	0.0153	0.0172	0.0049
	(0.72)	(0.30)	(1.44)	(0.95)	(0.94)	(0.26)
Year FE	No	Yes	No	Yes	No	Yes
No. of observations	1050	1050	1050	1050	1049	1049
No. of acquirers	671	671	671	671	671	671
Adjusted R-squared	0.211	0.232	0.185	0.204	0.173	0.189

Table 13: Controls for governance and synergies

This table reports OLS results from the estimation of equation (9) for the whole sample, including controls for governance indices developed by Gompers et al. (2003) and Bebchuk et al. (2009). The dependent variable is synergistic CARs for acquirer and target. These are computed based on the market model with their respective weights based on their market capitalizations six days prior to the day of announcement. The t-statistics are clustered at the acquirer level. Stars ***, **, * denote statistical significance at the 1%, 5%, and 10% levels. All regressions include a constant term. Definitions of all variables along with their sources are in Table 1.

	Synergy CAR(-1, +1)			Synergy CAR(-2, +2)			Synergy CAR(-5, +5)		
Management practices	0.0291*	0.0315*	0.0312*	0.0225	0.0212	0.0247	0.0247	0.0216	0.0211
	(1.90)	(1.92)	(1.88)	(1.39)	(1.34)	(1.45)	(1.18)	(1.12)	(0.93)
G-index	-0.0015		-0.0018	-0.0021		-0.004	-0.0026		-0.0004
	(-0.80)		(-0.61)	(-1.11)		(-1.22)	(-1.12)		(-0.11)
E-index		0.0002	0.0009		-0.0013	0.0048		-0.0069	-0.005
		(0.07)	(0.17)		(-0.38)	(0.78)		(-1.53)	(-0.58)
Bidder characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Deal characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of observations	159	194	148	159	194	148	158	193	147
No. of acquirers	130	164	122	130	164	122	130	164	122
Adjusted R-squared	0.177	0.156	0.168	0.069	0.107	0.067	0.091	0.123	0.058

Appendix

In this appendix, intended for online use only, we validate the estimation method of management practices and include additional sensitivity tests. To justify our approach for the estimation of management, we conduct a (i) semi-natural experiment based on data from the WMS and (ii) Monte Carlo simulations based on a frontier production efficiency model.

Subsequently, in table A2, we report average values of the estimated management practices index by year and industry. In table A3, we report average CAR values for the (-2, +2) window by year and Fama-French industry. In table A4, we report the standardized coefficients of the results reported in table 5. In table A5 we re-run our main specifications defining related industries as those with the same four-digit SIC code. In table A6, we show the correlations between the different measures of cumulative abnormal returns for acquirers, targets, and synergies. Finally, in table A7, we look at the performance of our management practices index in synergistic gains, while controlling for industry characteristics.

Validation of our management practices index

In this section, we show that the latent-variable model we use to estimate management practices is robust. We first estimate our model on data from the WMS, which is originated in the research by Bloom and Van Reenen (2007; 2010). This is a unique survey data set, aiming at thoroughly estimating management practices across several dimensions and explaining productivity differences of firms. The nice feature of this data set is that, independently from the derivation of the management practices index, it also reports information on basic inputs and output of firms. This allows the estimation of our model of equations (1) and (2), given equations (3) to (8). Subsequently, we compare our estimates of management practices with the Bloom and Van Reenen management scores.

We report summary statistics for our management practices index (WMS data) and the scores from WMS in Panel A of Table A1. Obviously, the two sets of statistics are closely related. The correlation coefficient between the two indices is 0.8951. In Panel B, we report the results from a bivariate regression of our management practices index on the WMS index. The results show that a one point increase in *Management practices* increases the equivalent measure from the WMS by 0.94 points. The R-squared of the regression equals 0.91. The summary statistics, the high correlation coefficient, and the regression results show the close resemblance of the two management practices indices.

Validation based on the WMS data forms an almost ideal natural experiment. However, it could be argued that such high correlations can only be obtained within that sample. To examine the out-of-sample performance of our approach, we also conduct a Monte Carlo exercise. We setup the Monte Carlo using a frontier model of production inefficiency of the form:

$$Y = F(K, L) = K^{\alpha} L^{\beta} \exp(v - u), \tag{A.1}$$

where Y is firm output and K, L are capital and labor, whose relative prices are w_K, w_L, respectively. Further, v is the error term and u is the inefficiency component.

We prefer a frontier stochastic efficiency model to show that our findings hold within an environment unfavorable to our approach (that does not include an inefficiency component) and more favorable to the literature estimating management from a frontier approach (e.g., Andreou et al., 2016; Bonsall IV et al., 2016; Demerjian et al., 2012). To derive realistic values for the exponents in equation (A.1), we actually estimate A.1 using our dataset in section 2 and set α = 0.623 and β = 0.344.

Following the same literature estimating management from frontier efficiency models, we assume u = 1-M, where M is management practices with a price w_M. For simplicity, we normalize the price of output to unity (this does not affect our results) and generate relative prices of inputs as uniform numbers in the interval (0, 1). We generate technical inefficiency as $u \sim N_+(0, \sigma_u^2)$, where $\sigma_u^2 = 0.3$ and $v \sim N_+(0, \sigma_v^2)$, where $\sigma_v^2 = 0.3$, so that the signal-to-noise ratio is equal to unity. Again, this is assumption comes from the estimation of equations A.1 using our dataset and a stochastic frontier approach. Then, we generate M from u = 1-M and the price of management $w_M = 10M\exp(\varepsilon_M)$, where $\varepsilon_M \sim N(0, 0, 1^2)$.

The first-order conditions for profit maximization of the usual inputs are as follows:

$$K = aY/w_K, L = \beta Y/w_L. \quad \text{(A.2)}$$

For management, the first-order condition is:

$$K^{\alpha} L^{\beta} \exp(v - u) = w_M. \quad \text{(A.3)}$$

Substituting the first-order conditions in the production function, we can generate bank output from:

$$Y = \left\{ \left(\frac{a}{w_K}\right)^{\alpha} \left(\frac{\beta}{w_L}\right)^{\beta} \exp(v - u) \right\}^{1-\alpha}. \quad \text{(A.4)}$$

Then, we generate inputs from equation (A.2), but for realism we allow some measurement error and generate inputs from:

$$K = aY/w_K \exp(\varepsilon_K),\ L = \beta Y/w_L \exp(\varepsilon_L), \tag{A.5}$$

where the error terms are distributed as $N(0, \sigma^2)$. Finally, we generate w_M from equation (A.3).

We consider 1,000 replications. In all cases we set the periods to T = 10 but conduct different exercises where the number of firms equals 100, 500, and 2,500. We also use different specifications, whereby (i) input prices on capital and labor are observed, (ii) the price of labor is missing (and thus is also latent), and (iii) the prices of labor and capital are missing. Of course, the last specifications introduce larger error.

We next estimate all variants using the simulated data and our approach discussed in section 2. In the table below, we report rank correlations between the simulated and the estimated management scores. For the larger dataset and when prices are observed, the rank correlations are as high as 92% and never fall below 85% for reasonably large datasets.

Rank correlations between simulated and estimated management practices

The table reports rank correlations between simulated management practices from the Monte Carlo method described in Section 4.1 and estimated management practices from the translog production function and the simulated samples. We report results from different sample sizes, where n is the number of cross-sections (banks). The number of periods T is fixed to T = 10.

	All prices observed	Missing w_L	Missing w_L and w_F
n=1,500	0.85	0.80	0.75
n=2,000	0.89	0.83	0.79
n=2,500	0.92	0.88	0.85

Table A1. Management practices estimates vs. WMS scores

Panel A reports detailed summary statistics (percentiles and smallest value, overall mean, standard deviation, variance, skewness and kurtosis) for management practices estimates using our model and WMS data and management practices scores from the WMS data. Panel B reports the results (coefficient estimates and t--statistics) from the regression of our management practices estimates on the management practices scores from the WMS data set. Stars *** and ** denote statistical significance at the 1% and 5% levels, respectively.

Panel A			
Management practices estimates using WMS data			
1%	1.34		
5%	1.88		
10%	2.15		
25%	2.65	Mean	3.23
50%	3.18	Std. Dev.	0.86
75%	3.74		
90%	4.20	Skewness	-0.24
95%	4.44	Kurtosis	2.66
99%	5.02		
Scores from WMS data			
1%	1.42		
5%	1.94		
10%	2.22		
25%	2.72	Mean	3.22
50%	3.28	Std. Dev.	0.75
75%	3.78		
90%	4.19	Skewness	-0.20
95%	4.39	Kurtosis	2.59
99%	4.72		
Panel B			
Regression of management practices estimates on WMS scores			
Management practices	0.942***		
	(133.1)		
Constant	0.210**		
	(2.15)		
R-squared	0.91		

Table A2: **Average values of the management practices index by year and industry**

This table presents average values of the management practices index for the whole sample by each year for the twelve Fama-French industries. Some of the industries have empty cells, because in the process of calculating the management practices index we had missing observations from Compustat. Apart from the average values of the management practices index by year and industry, this table presents the number of best and worst outcomes for each industry within the period 1980-2016 based on our calculations of the management practices index. Definitions of all variables along with their sources can be found in table 1.

Year	All	Non-durables	Durables	Manufacture	Oil, gas, coal	Chemicals	Business Equipment	Telephone, TV	Utilities	Wholesale, retail	Healthcare, drugs	Finance	Other
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
1980	1.407	1.298		1.620	1.158		1.845	1.516		0.939			
1981	1.525	1.383	1.584	1.414	1.568	1.325	1.482	1.713		1.598	1.591		1.755
1982	1.523	1.447	1.657	1.577	1.476	1.580	1.439	1.593		1.533	1.464		1.520
1983	1.528	1.682	1.604	1.425	1.594	1.544	1.494	1.647		1.511	1.444		1.551
1984	1.497	1.394	1.486	1.515	1.527	1.216	1.489	1.703		1.515	1.655		1.483
1985	1.500	1.435	1.384	1.487	1.408	1.614	1.593	1.499		1.508	1.250	1.080	1.607
1986	1.545	1.564	1.778	1.492	1.213	1.495	1.531	1.606		1.626	1.573		1.514
1987	1.515	1.401	1.446	1.656	1.517	1.499	1.583	1.695		1.412	1.313		1.307
1988	1.508	1.523	1.429	1.579	1.513	1.678	1.482	1.570		1.514	1.289	1.863	1.404
1989	1.516	1.358	1.558	1.509	1.578	1.589	1.495	1.432		1.486	1.605		1.584
1990	1.550	1.464	1.745	1.594	1.641	1.199	1.502	1.645		1.497	1.496	1.530	1.639
1991	1.523	1.290	1.674	1.355	1.515	1.574	1.511	1.695		1.548	1.543	1.780	1.569
1992	1.488	1.342	1.476	1.468	1.389	1.515	1.499	1.498		1.637	1.497	1.166	1.528
1993	1.507	1.602	1.404	1.500	1.524	1.588	1.498	1.591	1.732	1.429	1.511	1.513	1.519
1994	1.510	1.241	1.486	1.568	1.642	1.648	1.479	1.538		1.455	1.504	1.713	1.520
1995	1.509	1.491	1.437	1.513	1.552	1.626	1.490	1.515		1.529	1.537		1.485
1996	1.510	1.431	1.364	1.507	1.486	1.459	1.507	1.519	1.906	1.622	1.515		1.513
1997	1.526	1.508	1.558	1.589	1.470	1.600	1.512	1.531		1.518	1.447	1.199	1.543
1998	1.511	1.513	1.444	1.498	1.597	1.548	1.522	1.411		1.538	1.508	1.335	1.498
1999	1.518	1.507	1.600	1.450	1.485	1.572	1.506	1.650	1.314	1.473	1.502		1.609
2000	1.506	1.569	1.552	1.607	1.469	1.385	1.529	1.452		1.364	1.420	1.665	1.444
2001	1.507	1.452	1.603	1.569	1.381	1.494	1.527	1.475		1.381	1.488	1.941	1.461
2002	1.516	1.514	1.630	1.519	1.547	1.222	1.473	1.635		1.439	1.582	1.817	1.579
2003	1.511	1.514	1.362	1.532	1.530	1.927	1.490	1.610	1.372	1.599	1.513	1.506	1.437
2004	1.542	1.610	1.606	1.553	1.497	1.460	1.519	1.727		1.608	1.506	1.798	1.610
2005	1.444	1.686	1.246	1.367	1.464	1.585	1.422	1.637	1.812	1.451	1.506	1.486	1.365
2006	1.516	1.309	1.852	1.452	1.500	1.463	1.519	1.723		1.521	1.581	1.342	1.513

2007	1.505	1.442	1.394	1.543	1.475	1.416	1.548	1.400		1.479	1.488	1.697	1.461
2008	1.501	1.415	1.309	1.511	1.413	1.404	1.482	1.339		1.538	1.574	1.894	1.515
2009	1.523	1.584	1.328	1.524	1.404	1.614	1.510	1.200	1.483	1.796	1.473	1.759	1.590
2010	1.530	1.540	1.500	1.544	1.595	1.665	1.466	1.456	1.211	1.703	1.546	1.102	1.546
2011	1.476	1.605	1.277	1.481	1.593	1.549	1.467	1.350		1.582	1.467		1.453
2012	1.477	1.459	1.142	1.443	1.428	1.437	1.491	1.611		1.469	1.459	1.038	1.522
2013	1.505	1.477	1.551	1.505	1.399	1.451	1.475	1.615		1.469	1.572		1.526
2014	1.538	1.604	1.445	1.543	1.624	1.642	1.475	1.522	1.801	1.481	1.627	1.416	1.557
2015	1.529	1.496	1.552	1.470	1.456	1.396	1.579	1.623		1.474	1.448		1.626
2016	1.464		1.212	1.415		1.435	1.600			1.373	1.486		1.438
Avg.	1.508	1.476	1.491	1.511	1.490	1.512	1.514	1.554	1.579	1.503	1.500	1.529	1.522
# Best		2	4	0	1	4	2	5	4	3	1	9	2
# Worst		4	9	1	3	6	1	1	1	2	1	7	1

Table A3: **Average CAR (-2, +2) by year and Fama-French industry**

Cumulative abnormal return, *CAR (-2, +2)*, is calculated two days around the event date. The calculation is based on the market model. Data regarding mergers and acquisitions, M&A, are obtained from the Thomson One Banker database for a period covering 1980 to 2016. The 12 industries are based on the Fama-French classification.

Year	All	Cons. non-durables	Cons. durables	Man.	Oil, gas, coal	Chem.	Business equip.	Tel./TV	Utilities	Whole. and retail	Health. and drugs	Finance	Other
1980	1.28%	-0.02%		-0.12%	-3.19%	-6.71%	26.39%	11.45%		-8.20%		1.23%	
1981	-0.90%	2.98%	1.17%	-1.25%	-0.74%	-5.42%	-1.16%	-1.49%	2.69%	-0.26%	-1.59%	-0.96%	-0.64%
1982	0.18%	1.21%	2.78%	0.47%	0.90%	-1.39%	0.48%	0.87%	1.18%	1.08%	-3.30%	-0.31%	2.09%
1983	0.27%	1.65%	-1.53%	0.14%	1.22%	1.16%	-1.33%	0.22%	0.20%	0.01%	-2.50%	0.89%	0.40%
1984	0.30%	1.57%	-0.34%	0.69%	1.65%	-1.52%	1.49%	-1.99%	1.26%	0.65%	5.58%	-0.64%	-0.17%
1985	0.55%	0.33%	1.76%	1.54%	0.39%	-0.74%	0.53%	2.68%	-2.45%	-0.44%	-0.35%	0.02%	2.04%
1986	1.03%	1.94%	7.10%	0.08%	3.08%	20.81%	-1.33%	1.81%	-0.52%	1.57%	-1.67%	-0.43%	1.59%
1987	-0.01%	2.04%	-0.64%	0.53%	-1.17%	-0.18%	2.99%	3.60%	-2.97%	7.62%	10.47%	-2.51%	-3.29%
1988	0.57%	-0.98%	-0.39%	0.18%	0.15%	1.62%	2.78%	1.80%	2.51%	1.21%	0.99%	-0.48%	2.13%
1989	0.16%	2.12%	0.37%	0.02%	4.36%	2.65%	-0.21%	3.03%	1.58%	-2.99%	-1.40%	-0.95%	4.02%
1990	0.59%	0.48%	3.22%	0.87%	3.38%	-1.67%	1.37%	-5.85%	-0.58%	1.85%	-2.66%	0.07%	0.89%
1991	2.05%	0.24%	5.28%	2.10%	1.06%	-1.45%	0.38%	16.53%	13.81%	0.59%	3.32%	1.54%	-0.24%
1992	1.77%	2.61%	4.18%	0.39%	3.98%	3.80%	4.75%	4.40%	9.12%	3.78%	0.21%	-0.12%	2.16%
1993	1.36%	-0.35%	0.83%	3.72%	0.69%	0.48%	3.14%	3.43%	1.32%	0.93%	1.99%	-0.06%	2.32%
1994	0.89%	-1.71%	1.68%	2.99%	4.92%	5.18%	1.69%	-0.88%	-3.84%	2.11%	0.34%	-0.34%	2.57%
1995	0.86%	0.18%	1.67%	1.14%	2.05%	1.70%	-0.57%	3.32%	1.22%	2.99%	1.79%	-0.04%	2.10%
1996	1.57%	2.02%	3.09%	2.62%	3.41%	-0.12%	2.44%	1.71%	0.22%	1.22%	1.24%	0.42%	2.79%
1997	1.14%	1.90%	1.81%	2.46%	0.71%	4.98%	1.51%	0.01%	-0.23%	1.18%	-1.10%	0.31%	3.27%
1998	-0.08%	-0.49%	3.40%	1.26%	-2.67%	-1.60%	0.10%	-0.73%	1.65%	1.41%	2.68%	-1.08%	-0.09%
1999	1.40%	2.31%	3.58%	2.28%	6.22%	2.71%	2.49%	-1.23%	-1.08%	2.13%	0.11%	-0.08%	1.98%
2000	-0.17%	0.80%	1.28%	1.13%	0.61%	-4.36%	-0.92%	-1.20%	0.10%	0.87%	-1.57%	0.10%	-0.07%
2001	0.71%	0.56%	-2.35%	2.20%	0.62%	3.52%	0.23%	2.09%	-0.67%	3.11%	1.29%	0.01%	2.44%
2002	0.47%	1.02%	0.05%	1.29%	1.79%	0.10%	0.76%	3.62%	-0.48%	1.88%	-0.01%	-0.63%	0.63%
2003	0.96%	3.05%	0.64%	3.28%	0.79%	5.32%	1.42%	-3.19%	-1.28%	0.33%	1.43%	-0.13%	2.43%
2004	0.50%	2.94%	7.06%	1.24%	0.37%	-1.08%	-0.44%	4.17%	-0.06%	2.18%	1.30%	-0.23%	2.36%
2005	0.62%	2.85%	-3.38%	2.35%	-0.22%	-1.37%	0.59%	-0.99%	1.61%	2.62%	-0.44%	0.07%	1.93%
2006	0.65%	2.16%	4.63%	2.25%	-3.22%	0.92%	0.61%	2.31%	1.31%	2.36%	1.90%	0.00%	0.71%
2007	0.63%	0.92%	0.28%	0.98%	2.98%	1.89%	0.03%	0.23%	0.48%	3.19%	1.53%	-0.01%	0.13%

2008	0.86%	6.67%	0.27%	1.86%	3.59%	-3.66%	-0.99%	-2.22%	-0.50%	0.10%	0.13%	0.79%	2.24%
2009	1.81%	10.53%	2.64%	1.17%	4.91%	7.92%	0.42%	8.22%	0.64%	2.38%	0.11%	2.66%	1.37%
2010	0.45%	-0.78%	2.66%	1.63%	-0.31%	0.37%	0.27%	-3.10%	-1.30%	4.13%	2.74%	-0.52%	1.04%
2011	0.36%	2.31%	-1.00%	-0.13%	0.64%	-1.19%	0.62%	4.34%	0.69%	0.31%	0.79%	-0.37%	1.00%
2012	1.04%	3.74%	0.47%	1.04%	1.29%	5.33%	1.34%	-1.70%	-0.58%	2.31%	-1.59%	0.74%	1.89%
2013	1.16%	0.53%	1.71%	1.83%	-0.16%	-0.45%	1.88%	4.78%	1.10%	4.13%	4.52%	-0.02%	1.52%
2014	1.40%	2.28%	-0.67%	2.41%	-0.64%	1.30%	0.17%	-2.04%	0.62%	1.05%	4.98%	0.80%	4.46%
2015	0.72%	3.06%	0.86%	-0.02%	-0.39%	3.10%	-1.04%	5.54%	-2.87%	3.69%	1.66%	0.41%	0.27%
2016	1.14%	-0.83%	8.20%	2.77%		-2.31%	0.69%			4.66%	0.10%	-0.13%	4.44%
Avg.	0.76%	1.67%	1.73%	1.34%	1.20%	1.07%	1.45%	1.77%	0.68%	1.56%	0.92%	0.00%	1.52%

Table A4: Benchmark model with management – Standardized values

This table reports standardized coefficients from the estimation of equation (9) with management practices. The dependent variable is the bidder's CAR, based on a two-day event window (-2, +2) around the announcement date. The results are for the whole sample, for frequent acquirers (acquirers who have completed at least five acquisitions within a three-year event window), and for occasional acquirers (acquirers who have completed at least two acquisitions within a three-year period). CAR calculation is based on the market model. The t-statistics are clustered at the firm level (acquirer). Stars ***, **, * denote statistical significance at the 1%, 5%, and 10% levels respectively. The last three specifications include firm and year fixed effects. All regressions include a constant term. Definitions of all variables along with their sources are in table 1.

	Whole sample	Frequent	Occasional	Whole sample	Frequent	Occasional
	(1)	(2)	(3)	(4)	(5)	(6)
Management practices	0.2343***	0.2069***	0.1923***	0.1820***	0.2002***	0.1740***
	(13.51)	(6.48)	(12.07)	(11.72)	(6.11)	(9.37)
Ln (acquirer size)	-0.0932***	-0.1536***	-0.1072***	-0.2390***	-0.4887***	-0.3367***
	(-6.28)	(-4.05)	(-6.48)	(-4.69)	(-3.99)	(-4.80)
Run-up	-0.0353**	-0.0273	-0.0390**	-0.0291	-0.0189	-0.0189
	(-2.06)	(-0.79)	(-2.09)	(-1.39)	(-0.42)	(-0.76)
Sigma	0.0381	0.0066	0.0029	0.0069	-0.0540	-0.0091
	(1.33)	(0.12)	(0.11)	(0.19)	(-0.56)	(-0.19)
Relative size	0.1284***	0.0747	0.1001***	0.1095***	0.1118	0.0688*
	(3.48)	(1.09)	(2.89)	(3.06)	(1.54)	(1.74)
Relatedness	0.0233**	-0.0317	0.0236*	0.0086	-0.0650	0.0066
	(2.05)	(-1.11)	(1.79)	(0.57)	(-1.51)	(0.37)
Friendly merger	0.0077	-0.0266***	0.0048	0.0019	-0.0197	0.0126
	(0.34)	(-5.61)	(0.13)	(0.07)	(-1.50)	(0.39)
Hostile merger	0.0055	-0.0240	-0.0034	-0.0021	-0.0123	0.0078
	(0.28)	(-1.33)	(-0.11)	(-0.09)	(-0.75)	(0.27)
Neutral merger	0.0091	-0.0210***	-0.0041	0.0019	-0.0287**	0.0069
	(0.53)	(-4.49)	(-0.19)	(0.11)	(-2.26)	(0.33)
Public (cash)	0.0099	0.0107	0.0123	0.0015	0.0274	0.0149
	(1.15)	(0.45)	(1.13)	(0.14)	(1.01)	(1.19)
Public (stock)	-0.0776***	-0.1024***	-0.0837***	-0.0692***	-0.1158***	-0.0743***
	(-5.70)	(-3.58)	(-5.11)	(-4.04)	(-3.48)	(-3.69)
Private (cash)	0.0043	0.0254	0.0014	-0.0031	0.0105	0.0048
	(0.44)	(0.94)	(0.13)	(-0.24)	(0.33)	(0.31)
Private (stock)	0.0548***	0.0178	0.0585***	0.0548***	0.0007	0.0663***
	(3.37)	(0.62)	(3.12)	(2.63)	(0.02)	(2.76)
Subsidiary (cash)	0.0327***	-0.0301	0.0229*	0.0087	-0.0648*	0.0017
	(3.03)	(-0.95)	(1.78)	(0.71)	(-1.68)	(0.11)
Free cash flow	0.0430	0.4640***	0.2062	0.2275	0.3628**	0.2746
	(0.21)	(3.13)	(1.09)	(1.32)	(2.55)	(1.37)
Tobin's q	-0.0913***	-0.0424	-0.0813***	-0.0733*	-0.0496	-0.0787*
	(-3.73)	(-1.01)	(-3.07)	(-1.72)	(-0.70)	(-1.68)
Leverage	0.0273*	0.0094	0.0091	-0.0188	-0.1026	-0.0621
	(1.83)	(0.34)	(0.56)	(-0.62)	(-1.35)	(-1.61)
Firm FE	No	No	No	Yes	Yes	Yes
Year FE	No	No	No	Yes	Yes	Yes
Observations	8,106	1,319	5,487	6,922	1,273	5,317
R-squared	0.093	0.086	0.074	0.347	0.294	0.346
Adjusted R-squared	0.091	0.074	0.071	0.125	0.101	0.110

Table A5: Four-digit relatedness index

This table reports OLS results for the estimation of equation (9). The dependent variable is the bidder's CAR, based on a two-day event window (-2,+2) around the announcement date. The results are for the whole sample, for frequent acquirers (acquirers who have completed at least five acquisitions within a three-year event window), and occasional acquirers (acquirers who have completed at least two acquisitions within a three-year period). CAR calculation is based on the market model. The t-statistics are clustered at the firm level (acquirer). Stars ***, **, * denote statistical significance at the 1%, 5%, and 10% levels, respectively. The last three specifications include firm and year fixed effects. All regressions include a constant term. Definitions of all variables along with their sources are in table 1.

	Whole sample	Frequent	Occasional
	(1)	(2)	(3)
Management practices	0.0515***	0.0541***	0.0488***
	(11.45)	(5.90)	(9.06)
Ln (acquirer size)	-0.0110***	-0.0233***	-0.0157***
	(-4.58)	(-3.98)	(-4.74)
Run-up	-0.0114	-0.0046	-0.007
	(-1.33)	(-0.27)	(-0.68)
Sigma	0.0402	-0.3094	-0.0535
	(0.22)	(-0.63)	(-0.22)
Relative size	0.0142***	0.0162*	0.0084
	(2.96)	(1.66)	(1.60)
Relatedness (based on 4 digit SIC codes)	0.0015	-0.0022	0.0039
	(0.54)	(-0.36)	(1.25)
Friendly merger	0.0015	-0.0263	0.0151
	(0.04)	(-1.63)	(0.38)
Hostile merger	-0.0057	-0.0287	0.0104
	(-0.15)	(-1.16)	(0.24)
Neutral merger	0.0032	-0.0632**	0.0142
	(0.08)	(-2.27)	(0.30)
Public (cash)	0.0019	0.0158	0.0076
	(0.43)	(1.39)	(1.43)
Public (stock)	-0.0235***	-0.0402***	-0.0253***
	(-3.79)	(-3.33)	(-3.50)
Private (cash)	-0.0005	0.0038	0.0016
	(-0.14)	(0.46)	(0.41)
Private (stock)	0.0170***	0.0027	0.0204***
	(2.72)	(0.21)	(2.82)
Subsidiary (cash)	0.0031	-0.0177*	0.0014
	(0.87)	(-1.74)	(0.33)
Free cash flow	0.0049	0.0092***	0.0059
	(1.13)	(2.71)	(1.12)
Tobin's q	-0.0018*	-0.0011	-0.0019*
	(-1.91)	(-0.71)	(-1.86)
Leverage	-0.0065	-0.0327	-0.0224
	(-0.57)	(-1.11)	(-1.53)
Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
No. of observations	7047	1320	5440
Adjusted R-squared	0.143	0.098	0.134

Table A6: Correlations matrix for cumulative abnormal returns

		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
[1]	CAR (-1, +1) acquirer	1								
[2]	CAR (-2, +2) acquirer	0.877	1							
[3]	CAR (-5, +5) acquirer	0.683	0.756	1						
[4]	CAR (-1, +1) target	0.070	0.055	0.049	1					
[5]	CAR (-2, +2) target	0.067	0.065	0.055	0.975	1				
[6]	CAR (-5, +5) target	0.058	0.062	0.105	0.917	0.941	1			
[7]	CAR (-1, +1) synergy	0.774	0.681	0.530	0.334	0.320	0.286	1		
[8]	CAR (-2, +2) synergy	0.691	0.798	0.609	0.288	0.308	0.279	0.903	1	
[9]	CAR (-5, +5) synergy	0.544	0.620	0.856	0.226	0.239	0.299	0.718	0.787	1

Table A7: Controls for industry characteristics in synergy equations

This table reports OLS results from the estimation of equation (9) using the whole sample and including additional controls for industry characteristics. The dependent variable is synergistic CARs for acquirer and target. These are computed based on the market model with their respective weights based on their market capitalizations six days prior to the day of announcement. The t-statistics are clustered at the acquirer level. Stars ***, **, * denote statistical significance at the 1%, 5%, and 10% levels. All regressions include a constant term. Definitions of all variables along with their sources are in Table 1.

	Synergy CAR(-1, +1)	Synergy CAR(-2, +2)	Synergy CAR(-5, +5)
Management practices	0.0499***	0.0500***	0.0476***
	(4.98)	(4.61)	(4.12)
Conglomerate	-0.0212***	-0.0245***	-0.0392***
	(-2.60)	(-2.75)	(-3.45)
Tech (target)	-0.0083	-0.008	-0.0047
	(-0.92)	(-0.74)	(-0.42)
Tech (both)	-0.001	0.0061	0.0037
	(-0.11)	(0.54)	(0.30)
RD intensity	-0.027	-0.0764	0.0149
	(-0.45)	(-1.23)	(0.22)
RD high	-0.0025	0.006	0.0024
	(-0.34)	(0.76)	(0.25)
Bidder characteristics	Yes	Yes	Yes
Deal characteristics	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
No. of observations	783	783	782
No. of acquirers	471	471	471
Adjusted R-squared	0.25	0.217	0.203